
Chapter 11

Conservation Planning on Grazing Lands

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Chapter 11

Conservation Planning on Grazing Lands

600.1100 General

General Manual 180-CPA (Part 409) establishes Natural Resource Conservation Service (NRCS) policy that guides NRCS employees as they provide assistance to clients for planning and implementing resource conservation plans.

The NRCS National Planning Procedures Handbook provides guidance on the "how to" of the planning process as related to the planning policy established by the General Manual.

The National Range and Pasture Handbook (NRPH) provides NRCS policy and the "how to" of grazing lands resource conservation planning. This handbook provides guidance and information concerning the planning process specifically for rangeland, grazed forest land, naturalized pasture, pastureland, hayland, and grazed and hayed cropland. The NRPH provides the technical guidance for developing resource information for inclusion in the Field Office Technical Guide (FOTG).

General Manual 450-TCH, Amendment 4 (Part 401) establishes NRCS FOTG policy. The local FOTG contains the technical information needed to assist clients in the development and application of conservation plans. It contains general resource information about the field office area, soil and site (range ecological sites, forest ecological sites, and forage suitability groups descriptions) information, quality criteria to be met by Conservation Management Systems (CMS's), guidance documents depicting the resource management planning thought process, practice standards for all practices applicable to the local field office area, and examples of the Conservation Effects Decision Making Process.

The Grazing Land Applications (GLA) decision support system part of the Field Office Computer System (FOCS) provides automated assistance in working with grazing lands clients to develop their conservation plans.

600.1101 Objectives

The objectives of conservation planning on grazing lands are to assist clients to:

- Understand the basic ecological principles associated with managing their land—the soil, water, air, plants, and animals.
- Realize they are part of the complex ecosystem and that their management decisions influence the ecological changes that occur.
- Realize their responsibilities and importance for protecting the environment and maintaining future options for the use of the resource.
- Develop a plan that meets the needs of the soil, water, air, plant, and animal resources and their management objectives.

Conservation plans for grazing lands include decisions for manipulating the plant community to manage the soil, water, air, plant, and animal resources. These five resources are clearly related and respond to each other in an interactive mode. On grazing lands, plants are the resource that directly affects the soil, water, air, and animal resources. Animals are resources, but they are also tools used in managing the plant resource that, in turn, affects soil, water, and air. Therefore, proper use of the grazing and browsing animals in managing plant communities is basic to achieving the desired results of an ecologically sound grazing lands conservation plan.

The major objective on grazing lands is the design and establishment of a grazing management plan that, when coupled with any necessary facilitating and accelerating practices, will meet the quality criteria for the five resources established in the local FOTG and the objectives of the client. When properly implemented, these conservation plans for ranches, dairies, and other livestock farms benefit the client, the local community, and the Nation. **Well-managed** grazing lands, along with the carbon sink they afford, the clean water and air they produce, the recreation they provide, and the plants, livestock, and wildlife they support, make a major contribution to the natural beauty of the landscape and to the maintenance of a quality and economically sound environment. NRCS assists clients to manage their grazing lands to meet their objectives and, at the same time, meet the needs of the soil, water, air, plant, and animal resources.

600.1102 Developing conservation plans

NRCS assists clients who own or control the land for which conservation plans are being prepared. It must be understood that:

- Clients make the decisions.
- Clients apply the practices and pay for them.
- NRCS is assisting them in preparing their plans.
- Conservation planning is productive when firm decisions have been made by the client. Recording practices in a conservation plan by NRCS personnel when the client has not made the decision to apply the plan, is not appropriate planning leading to resource management systems application. Conservation planning is productive when clients understand their ecosystem to the degree that their daily decisionmaking is impacted and they reflect this with decisions in the conservation plan.

For these reasons, **it is important that clients fully participate in all phases of planning.** Much of the understanding they acquire about the nature of their resources, on which they may base many of their decisions, comes during the inventory stage. Clients should know the kinds of plants on their land, how they grow, how they compete with each other, and how they respond to the intensity, frequency, and duration of harvest. Clients should also know how they can manage plants to achieve their objectives. It is essential to work on the land with the decision-maker that is empowered to make the necessary resource management decisions.

(a) Areawide conservation plan

Conservation plans generally are developed by an individual client. This client has the authority to make decisions on their property that solve the resource problems and achieve their desired objectives. An individual client's conservation plan is called a *Conservation Plan*. See the National Planning Procedures Handbook (NPPH) page 8.

Clients cannot always solve the resource problems or meet the social objectives of management through their actions on their operating unit. This is a situation where neighbors can work together to develop a conservation plan that will solve their resource problems and take advantage of a socioeconomic opportunities.

Neighbors can work together in many ways to solve resource management problems and meet their socioeconomic objectives. They can work together to:

- Develop a wildlife management and recreational hunting enterprise.
- Solve water quality problems in a stream or lake.
- Manage a riparian area that transverses their land.
- Manage a stream as a fishery and recreational fishing enterprise.
- Develop a hiking, trail riding, canoeing, or bird-watching, or similar enterprise that requires cooperation of all the landowners.

In many instances, landowners not only need to work together to solve problems and improve their socioeconomic status, but need to include public land managers, resource management agencies, cities, districts, and organizations that have a bonafide interest in the activities planned and applied on the private land because of offsite impacts. In these instances an area wide plan can be developed that coordinates the activities of all concerned. See NPPH, Areawide Conservation Plan or Areawide Conservation Assessment, page 8. Many times the Coordinated Resource Management (CRM) process is useful in assisting all the interested parties to come together for direct participation in the planning process. In this way all that have a vested interest in the management and use of the identified area can have ownership in the plan that results. See Coordinated Resource Management in the NPPH, page 11.

600.1103 Conservation planning process

(a) Preplanning

Preplanning is of major importance to the effectiveness of the planning process. Preplanning for an individual ranch or livestock farm includes the following activities.

- Gather materials and information needed for the conservation planning process, such as:
 - Maps (aerial, topographic)
 - Soils information (maps and interpretations)
 - Rangeland ecological site descriptions, forest ecological site descriptions, pasture and hayland suitability group descriptions
 - Wildlife habitat evaluation procedures
 - Conservation practice standards
 - Grazing lands job sheets (similarity index, range trend, range health, pasture health, grazed forest and naturalized pasture health, forage and livestock inventory, grazing management plan, plan narrative)
 - Equipment, such as forage clipping equipment, sharpshooter spade, knife
 - Informational material used to demonstrate techniques and principles to land managers.
 - Computer with Grazing Land Applications decision support system
- Prepare yourself for the planning effort:
 - Be knowledgeable about the basic ecological principles of pastureland, hayland, rangeland, grazable forest, and naturalized pasture in your work area and be prepared to discuss them in a manner that land managers can understand.
 - Be able to interpret maps; determine range similarity index, range trend, range health, pasture health, grazed forest health, forage value ratings, wildlife habitat evaluations, forage and animal inventories; and prepare grazing management plans and conservation plan narrative.
 - Understand all the grazing land conservation practices applicable to your work area.
 - Understand the husbandry for the livestock enterprises in the area.
- Understand the quality criteria for soil, water, air, plants, and animals as specified in Section III of your FOTG.
- Understand and be proficient in the nine steps of conservation planning.
- Understand and be proficient in the use of the GLA decision support system in FOCS to assist in the planning process.
- Determine as much as possible about clients. This allows you to understand their desires, objectives, and level of knowledge of ecological principles on grazing lands. Secure this information from notes in current conservation plans and visiting with field office personnel who may have worked with the individuals on prior occasions.
- Make firm dates with the clients and discuss the purpose of the planning dates. Ensure that they understand time requirements to schedule sufficient time for the planning dates. Arrive at the assigned time prepared for the day's work.
- Ensure that clients understand the basic knowledge and ecological principles for rangeland, grazed forest land, naturalized pasture, pastureland, hayland, and grazed and hayed cropland. Important items to know and understand are:
 - Identity of plants on their land
 - How plants grow
 - Plant vigor
 - Effects of kind, time, and degree of grazing use, lack of fire, and other management decisions on the historic edaphic climax plant community or the pastureland plant community
 - How plants compete with each other in native plant, pastureland, or hayland plant communities
 - Ecological site concept (explain the soil, plant relationship)
 - Pasture and hayland suitability groups
 - Range similarity index
 - Range trend
 - Range health
 - Forest understory reactions to canopy manipulation and grazing management
 - Forage value ratings
 - Forage production and habitat values of the different range conditions or plant communities that can exist on a range site

- Multiple use opportunities on grazing lands
- Soil erosion, condition, and contamination
- Waste management on grazing lands
- How grazing lands are managed with live-stock to protect or improve water quality and water yield
- Principles of water use by plants and how grazing management impacts it
- How grazing management can protect or improve air quality, such as odors or wind-blown dust
- Domestic animal need for food, water, and shelter
- Wildlife needs for food, water, and cover

An understanding of these basic principles by clients is essential to the grazing land planning process. Without this knowledge they cannot continuously inventory and analyze their resources, recognize problems and their causes, develop proper and obtainable objectives, formulate and evaluate treatment alternatives, plan a course of action, implement the plan, and continuously evaluate results and make improvements.

The success of a conservation plan is totally dependent upon the client's capabilities to make sound ecologically and economically feasible decisions on a daily basis. NRCS must ensure that clients have this understanding as it relates to their lands.

(b) Nine steps of conservation planning on rangeland, grazed forest, naturalized pasture, pastureland, hayland, and grazed and hayed cropland

Phase I of the planning process includes the first four steps, which are: identify problem, determine objectives, inventory resources, and analyze resource data. These four steps are interactive, usually occurring at the same time and not necessarily in the order as shown in the National Planning Procedures Handbook (NPPH). Clients generally request NRCS to assist them with particular problems they have identified. If they do not understand the basic ecological principles associated with their problems, they may have recognized a symptom as a problem and not recognized the cause of the symptom. In reality, the cause is the real problem needing treatment. For this reason, there is a logical sequence to follow in grazing land conservation planning even though the steps may occur concurrently, in any order, and may be repeated in the planning process.

After teaching or ensuring that the client understands the basic grazing lands ecological principles (part of preplanning), the first step in the planning process is to inventory resources. This is then followed by the analyze resource data, identify problems, and determine objectives planning steps. The following sections describe the planning steps in the order shown in the National Planning Procedures Handbook.

(c) Identify the problem

(1) General

When clients contact NRCS requesting assistance, they have perceived a problem and want to solve it. The perceived problem may actually be a symptom caused by the real problem. An example: the client has recognized streambank erosion occurring, and forage production is decreasing. To the client, these are definite problems, but both are symptoms of the problem of continuous grazing and poor grazing distribution. This problem has caused the plants in the pasture, particularly along the stream, to become very low in vigor and die. While doing so, they have not produced to potential and have been replaced with lower producing plants. The loss of cover and change in composition have decreased water infiltration, increased runoff, increased erosion, increased sediment yield to the stream, lowered water quality, reduced forage production and quality, reduced food and cover for wildlife, and continued to reduce forage for livestock production. The problem was not what the client originally perceived, but the lack of sound grazing management that caused the symptoms.

The NRCS objective is to help land managers recognize real problems, not just symptoms. When poor grazing management is a problem, the NRCS conservationist should not tell managers the problem is poor grazing management; instead, **the conservationist must lead them to recognize that grazing management is the problem.** This can be accomplished by helping them understand their grazing land ecosystems as described in preplanning. The process of recognizing the problem continues from preplanning through the steps of resource inventory and analyzing the resource data.

(2) Standard of recognizing problem

Land managers are led to recognize the symptoms and causes of problems through an understanding of the grazing land ecosystem and the inventory process.

(3) Activities

The activities needed to identify the problem are shown below.

What	How
Clients identify perceived problems	Personal observations, often without the knowledge required to identify the cause of the problem.
Clients develop an understanding of grazing lands ecosystems	NRCS personnel ensure that land managers understands their grazing lands ecosystems by teaching and showing them on their land.
Clients recognize the real problems, the causes of problems	NRCS assists land managers to: <ul style="list-style-type: none"> • Inventory of the resources in the grazing lands ecosystem. • Identify all the symptoms—soil, air, plant, and animal problems and potential problems—and the causes of each. • Recognize all the causes of symptoms as resource problems that must be addressed in the planning process.

(d) Determine the objectives

(1) General

All clients have a set of objectives. These objectives may or may not include the proper management of the grazing lands ecosystem to accomplish their desired objective. If not, the reason may be a lack of understanding of all the interactions in the ecosystem.

To assist clients in the planning process, objectives must be established by them after they fully understand the grazing lands ecosystem, have inventoried the resources, and identified the problems.

When working with clients, it is often best to not ask for firm objectives until these three processes have been accomplished. Some people do not like to change their mind once they have made a firm commitment to an objective. Assist them to understand and inventory their grazing lands resources and identify the problems before they express their objectives.

(2) Standard

NRCS employee leads the client to develop ecologically and economically sound objectives.

(3) Activities

The activities needed to determine the objectives are shown below.

What	How
Client expresses management objectives	This is accomplished many times without a sound understanding of grazing lands ecological principles, resource inventories, or problems identified.
Client expresses objectives for management that are ecologically, economically, and socially sound	NRCS personnel: <ul style="list-style-type: none">• Ensure that client understands the grazing lands ecosystems.• Assist managers in inventorying their grazing lands resources.• Assist managers in recognizing resource problems and causes.• Assist clients to establish objectives that are ecologically, economically, and socially sound.

(e) Inventory the resources

(1) General

Once the client understands the ecological principles of their grazing lands, they generally ask:

"What is the similarity index on my rangeland?"

"What are my range trends?"

"What is the range health?"

"How does my pasture compare to its potential?"

At this point the client is beginning to understand the dynamics of the grazing lands ecosystem and the fact that it is important to determine and understand as much as possible about their grazing lands. They will desire your assistance in inventorying the grazing land resources.

(2) Standard

NRCS employees assist clients in inventorying their grazing lands ecosystems and facilitating practices currently in place, current grazing management schemes, current husbandry practices, livestock performance, wildlife habitat and numbers, etc., to gain complete knowledge of current ecological and performance status. During this process the conservationist should develop an understanding of the client's resources available to implement the conservation plan.

(3) Activities

The activities needed to inventory the resources are shown below.

What

How

Secure needed materials for inventory

NRCS secures maps (aerial photos and soil maps), equipment used in the field, and technical information, such as range ecological site descriptions, forest ecological site descriptions, and pasture suitability groups.

Conduct the inventory

NRCS personnel:

- Assist the client to identify range sites, forest sites, and pasture suitability groups on aerial photos from soil interpretations and ground truthing.
- Determine similarity index, trend and health, and record on the plan map.
- Determine grazing distribution and indicate on map. Identify the key grazing sites and key species.
- Record fences, watering facilities, salt and feeding areas, bedding grounds, roads, corrals and working pens, poisonous plant areas, and other important features on the plan map.
- Complete wildlife habitat evaluations.
- Determine soil erosion, condition, and contamination.
- Identify sediment depositions.
- Evaluate water quality and water yield.
- Determine wildlife numbers and condition.
- Develop forage inventory.
- Develop livestock and wildlife inventory.
- Develop forage and animal needs balance sheet.
- Determine husbandry practices and livestock performance.
- Identify cultural resources, if present.
- Identify endangered plant and animal species and habitat, if present.
- Identify active and potential recreation resources.
- Identify available resources.

(f) Analyze resource data

(1) General

After the inventory process is complete, an analysis of the data is necessary to assist the client to identify and quantify problems. Again, it is imperative for clients to understand the grazing lands ecosystems and concepts before they can analyze resource data. It is only then that they can understand the relationship of soil, water, air, plant, and animal resources in ecosystems and the causes that create resource problems. The analysis may point out opportunities that the client has not recognized, such as fee hunting, camping, bed and breakfast, renting farm and ranch housing facilities for weekends, trail drives, fishing, hiking, bird-watching, and new livestock enterprises.

(2) Standard

NRCS assists client in analyzing the inventory data so they may recognize resource problems as well as new opportunities.

(3) Activities

The activities needed to analyze resource data are shown below.

What

How

Evaluate the current grazing lands ecosystem in relation to site potentials

NRCS assists land managers to determine:

- If the current plant community provides the desired attributes of forage production, habitat, water quality and quantity, air quality, soil protection, and animal performance.
- Plant vigor of desired species.
- Range trend (on rangeland).
- Grazing distribution uniformity.
- Forage value rating on grazed forest and naturalized pasture.
- Desirability of pastureland plant species for the season and forage production needed.
- If pastureland is being managed for desired level of forage quality and quantity.
- Forage production and wildlife habitat values in relation to potential for the site.
- Balance between forage production and the forage requirements of domestic animals and wildlife.
- Effects of the current grazing management program on the plant community, domestic animals, and wildlife of concern.
- Significance of cultural resources, if present?
- Endangered or threatened plant or animal species, if present.
- Opportunity for new enterprises.

(g) Formulate alternative solutions

(1) General

Phase II of the planning process begins with development of alternative solutions. On grazing lands, the alternative solutions **must** include a forage inventory and a grazing management plan. These should be prepared for the first year of the plan. A future forage inventory and grazing management plan representing predicted responses and future grazing management plans should also be prepared.

At least one of the alternatives developed should be a Resource Management System (RMS), meeting the quality criteria for all resource problems identified and the objectives of the client. The Conservation Effects Decision (CED) worksheets generated in FOCS can be used to present impact of the RMS and other alternatives to the client.

In developing Resource Management System alternatives, vegetation management practices will be planned that meet the needs of the plants and animals. Facilitating practices, such as fences and water development, will be planned when needed to enable the application of the planned vegetative management practices. Accelerating practices will be planned when needed to treat specific problems or opportunities that grazing management alone will not solve.

(2) Standard

NRCS employees will assist the client to develop treatment alternatives that meet quality criteria in the FOTG for resource problems identified and that accomplish objectives of the client.

(3) Activities

The activities needed to identify the problem are shown below.

What	How
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Develop treatment alternatives	Select the vegetation management, facilitating, and accelerating practices that will meet quality criteria established in local FOTG for all resource problems identified, and meet management objectives of client. Develop sufficient number of alternatives from which client may select an alternative to meet their needs.
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(h) Evaluate alternative solutions

(1) General

After alternative solutions are developed, client evaluates them to determine which one best meets their objectives and solves the identified resource problems.

(2) Standard

Effects of each alternative are evaluated individually and compared to benchmark for their ability to solve or alleviate identified resource problems and meet clients objectives.

(3) Activities

The activities needed to evaluate alternative solutions are shown below.

What	How
Determine ecological, economical, and social effectiveness of treatment alternatives	<div>Determine:<ul style="list-style-type: none">• Effectiveness of the alternative to achieve the desired plant community.• Effectiveness of each alternative to solve or alleviate each of the soil, water, air, plant, and animal resource problems.• Economic and social feasibility of each alternative. Grazing Land Applications decision support system can assist in the economic evaluation of the treatment alternative.• If the producer has the willingness, values, skills, and commitment to apply the system of practices.</div>

(i) Make decisions

(1) General

After all the alternatives have been evaluated, the client makes a decision on which alternative meets their objectives. This is accomplished by comparing the alternatives to determine which:

- Will best achieve the desired plant community
- Will meet the desired time schedule
- Is the most financially and economically sound
- Is consistent with the client's knowledge and skills
- Is consistent with the client's time and distance restraints

After the alternative is selected, it is recorded in a manner that will assist the land manager in application.

Application of the selected alternative is usually a logical sequence and should be reflected in the schedule of application in the plan narrative. The following logic provides ideas for scheduling application.

If livestock are on the operating unit, then prescribed grazing should be scheduled and applied from the beginning. If fencing and water development must be installed before applying the prescribed grazing plan, then they should normally be installed next.

Water developments generally are installed before fences because the specific locations of planned ponds, wells, and pipelines may need to be moved to a new location, which may affect the location of the planned fence. Once the water developments are applied, then the fencing can be installed without worry of whether the pond can be built or the planned well will yield a sufficient water supply.

After the fences and water distribution are installed, the prescribed grazing plan can be initiated. Accelerating practices, such as brush management, range planting, prescribed burning, and critical area treatment, can now be performed as fencing and water development will allow the needed grazing management to be applied. Each operating unit will have its unique set of circumstances that dictate the schedule of application. **A major point to remember is that grazing management is the key to the success of all accelerating practices.**

(2) Standard

NRCS leads the client to select alternatives that best meet the manager's objectives. Decisions are recorded in the conservation plan.

(3) Activities

The activities needed to make decisions are shown on page 11–12.

What	How
Client selects best alternatives to meet their objectives	NRCS assists the client in comparing each of the alternative evaluations to determine the one that best meets the objectives.
Schedule of application	NRCS personnel assist the client in developing a long-term schedule of application that ensures proper sequence and timing of applications for success.
Conservation plan prepared	<p>NRCS assists the client in preparing the conservation plan. Client's copy should contain:</p> <ul style="list-style-type: none"> • Soil and water conservation district agreements. • Conservation plan maps, which should delineate as scale of map permits: <ul style="list-style-type: none"> — Operating unit boundary — Planned field boundaries, number, and acres — Land use of each field — Location of present and planned enduring practices — Range ecological site delineation — Range similarity index — Range trend — Pasture and hayland species — Pasture and hayland suitability groups — Forest ecological site delineation — Forage value ratings on grazed forest land and naturalized pasture — Other pertinent information, such as roads and livestock handling facilities • Soils map and legend • All inventory data • Forage inventory, livestock inventory, and grazing management plan • Record of treatment alternatives selected and schedule of application • Fact sheets and/or job sheets <p>NRCS case file contains</p> <ul style="list-style-type: none"> • All information placed in the client's copy • Directions for location of the land unit(s) • List of job sheets furnished to the client • Technical assistance notes • Record of accomplishments

(j) Implement plan

(1) General

The land manager is now ready to implement the plan. NRCS personnel shall provide technical assistance to the client in the application of all practices as needed and requested.

The most difficult and complex practices to apply are the grazing management practices—Forage Harvest Management and Prescribed Grazing. These practices, respectively, are the proper application of hayland harvest and the proper manipulation of livestock number, kind, and class through pastures in a time and manner that causes the plant community composition to move toward the one most desired and, at the same time, meet the needs of the livestock and wildlife of concern. For this to be successful, land managers often require close and continuous technical assistance from NRCS personnel as they learn to make the needed plant community observations and adjustments in management strategy.

NRCS does not establish grazing capacities. Neither does it require an agreed-on stocking rate in conservation plans. NRCS assists land users in making their own decisions concerning the number and kinds of animals that can be safely and profitably grazed.

(i) Forage inventory—Clients must have a clear understanding of their forage resources (their limitations and requirements) and of the grazing habits of the animals using the forage. In establishing an initial stocking rate, they should rely on their experiences as much as possible. Local production and stocking information can be used to supplement the client's experiences. This information is in the Ecological Site Descriptions for rangeland, forest land and the Forage Suitability Groups in Section III of the local Field Office Technical Guide.

A forage inventory must be developed that reflects an estimate of forage supply in each management unit (pasture or field) of the operating unit. See chapter 4 of this handbook for guidance in preparing a forage inventory.

(ii) Animal inventory—An inventory of the domestic animals occupying or planned to occupy the operating unit must be developed. This animal inventory should be separated into the necessary herds to allow

the desired husbandry to be practiced. This is generally by kind, breed, class, and age. If a management unit is critical to a particular herd, it should be noted. The number of livestock is shown in each management unit to be grazed by the day, week, month, or season, and a total is used to plan the forage demand in relation to forage production.

Herbivorous wildlife numbers should be determined by management unit and their forage requirements expressed in the same manner as the livestock. If they are migratory, such as elk, the time they are expected to be in the management unit must be determined. See chapter 4 for guidance on developing a forage inventory.

(iii) Activities affecting the prescribed grazing schedule—Items affecting the Prescribed Grazing Plan must be identified. Examples of these items include:

- husbandry practices
- nutrient requirements of animals
- forage quality requirements
- practice application requirements
- hunting season needs
- recreation activities, such as camping
- endangered plant and animal species needs
- watershed water quality and quantity needs
- riparian needs
- predator problems
- insect problems
- parasite problems
- poisonous plants
- animal shelter needs
- wildlife habitat needs
- aesthetic and social considerations
- cultural resources
- critical areas needing special treatment

(iv) Scheduling grazing—After the forage and animal inventory is completed and other factors affecting the prescribed grazing schedule is determined, the prescribed grazing schedule can be developed. This is accomplished by the client scheduling the livestock movement through the pastures in a manner that will:

- Balance forage requirement with forage supply.
- Meet the growth needs of the plants.
- Meet the forage quality needs of the animals.
- Meet health and husbandry needs of the livestock.

- Meet the needs of the wildlife of concern.
- Meet the needs of all other activities in the management and operating units.
- Meet the client's objectives.

Supplemental feed requirements needed to meet the desired nutritional level for the kind and class of livestock and browsing and grazing wildlife of concern will be specified. See chapter 6 for guidance on animal nutrition.

The prescribe grazing plan includes a contingency plan that details potential problems; i.e., drought, and a guide for adjusting the grazing prescription to ensure resource management and economic feasibility. The plan should include how the client will recognize the potential problem in the early phases (drought) and a plan of action that will be taken to offset and minimize the deterioration of the resources, livestock, and wildlife and the economics of the operation. See chapter 5 for guidance in design of the Prescribed Grazing practice.

(v) *Facilitating and accelerating practices—*

Facilitating and accelerating practices all require technical design or specific application instructions. NRCS personnel are responsible for providing this information to the client, and the necessary on-site technical assistance during application to ensure technical adequacy and success. See Chapter 5 for a discussion of facilitating and accelerating practices.

(2) Standard

NRCS provides technical assistance to the client to ensure the successful application of the planned practices.

(3) Activities

The activities needed to implement the plan are shown below.

What	How
Application of Prescribed Grazing Schedule	NRCS personnel provide technical assistance to client in the design and application of the prescribed grazing plans. Prescribed grazing plan application is an ongoing process. For many clients it is a change in lifestyle as it becomes a daily decision process that may affect their daily routine. Each management decision made on the operating unit that affects plants, livestock, and wildlife is part of the plan. Application is a daily process. NRCS personnel must provide onsite assistance in a timely manner to continually teach clients to observe their grazing lands, livestock, and wildlife and make the grazing management decisions that will ensure success. GLA decision support system is a tool to assist in this process.
Application of facilitating and accelerating practices	<p>Facilitating practices, such as fences, ponds, wells, water storage facilities, pipelines, and troughs all need to be installed according to a technical design to ensure success. NRCS personnel shall provide the onground technical assistance needed for design and installation.</p> <p>Accelerating practices, such as brush management, weed control, nutrient management, forest improvement, range planting, pasture planting, prescribed burning, waterspreading, critical area treatment, diversions, streambank and shoreline protection, and structures for water control, all need to be installed according to a technical design to ensure success. NRCS shall provide the technical assistance needed for design and installation.</p>

(k) Evaluation of results

(1) General

After clients initiate the application of their grazing land management plans, NRCS should provide followup assistance. As previously stated, grazing management is an ongoing process. The client may need assistance of NRCS personnel to evaluate results of the applied Prescribed Grazing Schedule. It is a continuous learning process for the client and NRCS personnel who are gaining experience. Grazing management can often be fine tuned through adaptive management to more efficiently and effectively accomplish objectives. Many times, clients increase their knowledge in grazing management and desire to change to more intensive grazing management schemes. This often requires a plan revision to include more fences, water development, or both, as well as a completely revised Prescribed Grazing Schedule.

The client's objectives often change, or new technology arrives that the client should consider. New resource problems are often recognized as the technical

and management knowledge and skills of the client increases.

NRCS continuously gathers data from local grazing management application experiences. This information builds data bases of responses to treatment. These response evaluations are necessary to assist future clients in the planning process.

The initial planning process is just the beginning of the learning and understanding of grazing management for many clients. Experience has shown that most clients will not and cannot successfully apply their plan without followup evaluation assistance from trained NRCS personnel. For these reasons, periodic contact needs to be made with the client to ensure the continued success of the conservation plan and to collect response data for future assistance to clients.

(2) Activities

The activities needed to evaluate results are shown below.

What	How
Provide needed followup for evaluation of results, fine tuning of grazing management plan, revision of plan, and obtaining response data	<p>Make firm date with client for followup evaluation assistance. Explain the purpose of the contact so they may prepare.</p> <p>Review on the ground the results of the applied grazing management. Use the opportunity to teach and assist clients to recognize trends in plant community response. Assist them to adjust the grazing management to cause the plant community to respond as desired, provide quantity and quality forage needed by livestock and wildlife of concern, and meet the needs of the soil, water, air, plant, and animal resources.</p> <p>Review the schedule of application of facilitating and accelerating practices. Review those that have been applied to evaluate their continued success. Assist in improving the schedule of application. Assist in recognizing any maintenance needed on applied practices.</p> <p>Gather response data that will improve our ability to predict future responses to treatment. Special attention should be given to gathering response needed for the GLA decision support system.</p> <p>Assist clients to identify new resource problems that need attention.</p> <p>Provide clients new technical information applicable to their resource problems.</p> <p>Assist the clients to revise their conservation plans as needed. Follow the nine steps of conservation planning to accomplish this process.</p>

References

- Ahlgren, G.H. 1949. Forage crops. McGraw-Hill Book Co., New York, NY.
- Anderson, E.W. 1974. Indicators of soil movement on range watersheds. *Journal of Range Management* 27:244–247.
- Anderson, W.P. 1983. *Weed science: Principles*, 2nd ed. West Publishing Co., St. Paul, MN.
- Archer, S., and F.E. Smeins. 1991. Ecosystem level processes. *Grazing Management an Ecological Perspective*, chapter 5, R.K. Heitschmidt and J.W. Stuth, eds., Timber Press, pp. 109–139.
- Armbrust, D.V. 1968. Windblown soil abrasive injury to cotton plants. *Agronomy Journal* 60:622–625.
- Ashton, F.M., and T.J. Monaco. 1991. *Weed science, principle and practice*. 3rd ed. John Wiley and Sons, New York, NY.
- Ball, D.M., C.S. Hoveland, and G.D. Lacefield. 1991. Southern forages. Potash and Phosphate Institute, Norcross, GA.
- Barker, S., and K. Egen. 1993. Range trend monitoring in southern Arizona. *Rangelands* 15(4):166–167.
- Barnes, K.K., W.M. Carleton, H.M. Taylor, R.I. Throckmorton, and G.E. Vanden Berg (organizers). 1971. *Compaction of agricultural soils*. American Society of Agricultural Engineers. St. Joseph, MI.
- Barnes, R.F., D.A. Miller, and C.J. Nelson. 1995. *Forages, the science of grassland agriculture*. 5th ed., Vols. 1 and 2, Iowa State University Press, Ames, IA.
- Barnes, T.G., R.K. Heitschmidt, and L.W. Varner. 1991. Wildlife. In *Grazing Management: An Ecological Perspective*, R.K. Heitschmidt and J.W. Stuth (eds), chapter 8, Timber Press, Portland, OR, pp. 179–190.
- Baver, L.D. 1961. *Soil physics*. 3rd ed., John Wiley and Sons, New York, NY.
- Bedunah, D.J., and R.E. Sosebee. 1995. *Wildland plants, physiological ecology and developmental morphology*. Society for Range Management, Denver, CO.
- Belnap, J., and J.S. Gardner. 1993. Soil microstructure in soil of the Colorado Plateau: The role of the cyanobacterium *Microcoleus vaginatus*. *Great Basin Naturalist* 53: 40–47.
- Black, C.A. 1957. *Soil-plant relationships*. John Wiley and Sons, New York, NY.
- Blackburn, W.H. 1975. Factors influencing infiltration and sediment production of semiarid rangelands. *Nevada Water Resources Res.* 11:929–937.
- Blackburn, W.H., and M.K. Wood. 1990. Influence of soil frost on infiltration of shrub coppice dune and dune interspace soils in southern Nevada. *Great Basin Naturalist* 50:41–46.
- Blackburn, W.H., F.B. Pierson, C.L. Hanson, T.L. Thurow, and A.L. Hanson. 1992. The spatial and temporal influences of vegetation on surface soil factors in semiarid rangelands. *Transactions of the ASAE*. 35:479–486.
- Blackmore, J. 1958. Do fertilizers pay? *In Efficient use of fertilizers*. FAO Agricultural Studies No. 43, Food and Agricultural Organization of the United Nations, Rome, Italy.
- Blaser, R.E., et al. 1986. *Forage-animal management systems*. Virginia Polytechnic Institute and State University, Blacksburg, VA.
- Blue, W.G., and V.W. Carlisle. 1985. Soils for clovers. In *Clover Science and Technology*, N.L. Taylor (ed.), Amer. Soc. Agron., Madison, WI, pp. 185–204.
- Bolton, J.L., and R.E. McKenzie. 1946. The effect of early spring flooding on certain forage crops. *Scientific Agriculture* 26:99–105.
- Bond, R.D., and J.R. Harris. 1964. The influence of the microflora on the physical properties of soils. Effects associated with filamentous algae and fungi. *Australian Journal of Soil Research* 2:111–122.

- Bondi, A.A. 1987. Animal nutrition. John Wiley and Sons, New York, NY.
- Bonham, C.D. 1989. Measurements for terrestrial vegetation. Wiley-Interscience, John Wiley and Sons, New York, NY.
- Bosworth, S.C. 1995. High potassium forages and the dry cow. University of Vermont, Burlington, VT.
- Bower, C.A. 1959. Chemical amendments for improving sodium soils. Agric. Info. Bul. No. 195, U.S. Gov. Print. Off., Washington, DC.
- Brady, N.C. 1974. The nature and properties of soils. 8th Ed., Macmillan Publ. Co., New York, NY.
- Brady, N.C., and A.G. Norman. 1957, 1965, and 1970. Advances in agronomy. Vols. 9, 17, and 22, Academic Press, New York, NY.
- Brady, N.C., and R.R. Weil. 1999. The nature and properties of soils, 12th ed. Prentice-Hall, Inc., Upper Saddle River, NJ.
- Briske, D.D. 1991. Developmental morphology and physiology of grasses. Grazing Management, an Ecological Perspective, ch. 4, R.K. Heitschmidt and J.W. Stuth (eds.), Timber Press, pp. 85–107.
- Briske, D.D., and J.H. Richards. 1994. Physiological responses of individual plants to grazing: Current status and ecological significance. In Ecological Implications of Livestock Herbivory in the West, N. Vavra, W.A. Laycock, and R.D. Pieper (eds.), Society for Range Management, Denver, CO, pp. 147–176.
- Bryan, R.B. 1987. Processes and significance of rill development. In Bryan, R.B. (ed.), Rill erosion: processes and significance. Catena Supplement, 8, Catena Verlag, Germany, pp 1–16.
- Buckner, R.C., and L.P. Bush. 1979. Tall fescue. Agronomy Monograph No. 20, American Society of Agronomy, Madison, WI.
- Chapin, F.S., III. 1993. Functional role of growth forms in ecosystem and global processes. In J.R. Ehleringer and C.B. Field (eds.), Scaling physiological processes: leaf to globe. Academic Press, San Diego, CA, pp. 287–312.
- Castle, E.N., M.H. Becker, and A.G. Nelson. 1987. Farm business management: The decision-making process. Macmillan Publ. Co., New York, NY, 413 pp.
- Cathey, H.M. 1990. USDA plant hardiness zone map. Misc. Pub. No. 1475, USDA, Agric. Res. Serv., Washington, DC.
- Chepil, W.S. 1945. Dynamics of wind erosion IV. The translocating and abrasive action of the wind. Soil Science 61:167–171.
- Chepil, W.S., and N.P. Woodruff. 1963. The physics of wind erosion and its control. Advances in Agronomy 15:211–302.
- Chessmore, R.A. 1979. Profitable pasture management. Interstate Printers and Publishers, Danville, IL.
- Church, D.C. 1991. Livestock feeds and feeding, 3rd ed. Prentice Hall, NJ.
- Church, D.C., and W.G. Pond. 1976. Basic animal nutrition and feeding. John Wiley and Sons, New York, NY.
- Clements, F.E. 1916. Plant succession: An analysis of the development of vegetation. Carnegie Inst., Washington Pub. 242:1–512.
- Committee on Rangeland Classification, Board of Agriculture, National Research Council. 1994. Rangeland health: New methods to classify, inventory, and monitor rangelands. National Academy Press, Washington, DC, 180 pp.
- Committee on the Role of Alternative Farming Methods in Modern Production Agriculture, Board on Agriculture, National Research Council. 1989. Alternative agriculture. National Academy Press, Washington, DC, 448 pp.

- Cook, C.W., and J. Stubbendieck, eds. 1986. Range research: Basic problems and techniques. Society for Range Management, Denver, CO.
- Cooper, J.P. (ed.). 1975. Photosynthesis and productivity in different environments. Cambridge University Press, Cambridge, MA.
- Copeland, J.D. 1995. Recreational access to private lands: Liability problems and solutions. National Center for Agricultural Law Research and Information, University of Arkansas, Fayetteville, AR, 215 pp.
- Cornell University. 1987. Cornell field crops and soils handbook, Ithaca, NY.
- Cornell University. 1992. 1993 Cornell recommendations for integrated field crop management. Cornell University, Ithaca, NY.
- Cowan, J.R. 1956. Tall fescue. *In* Advances in Agronomy, Vol. VIII, Academic Press, New York, NY.
- Dalrymple, R.L., R. Mitchell, B. Flatt, W. Dobbs, S. Ingram, and S. Coleman. 1999. Crabgrass for forage: management from the 1990s. The Noble Foundation, Ardmore, OK.
- Daubenmire, R. 1968. Plant communities: A textbook of plant synecology. Harper and Row, New York, NY.
- Dawson, T.E., and F.S. Chapin, III. 1993. Grouping plants by their form-function characteristics as an avenue for simplification in scaling between leaves. *In* Ehleringer, J.R., and C.B. Field (eds.), Scaling physiological processes: leaf to globe. Academic Press, San Diego, CA, pp 313–322.
- Decker, A.M., and T.S. Romingen. 1957. Heaving in forage stands and in bare ground. *Agronomy Journal* 49:412–415, American Society of Agronomy, Madison, WI.
- Dethier, B.E., and M.T. Vittum. 1963. Growing degree-days. New York State Agric. Exp. Sta. Bul. No. 801, Geneva, NY.
- Dubos, R.J. 1978. The resilience of ecosystems, an ecological view of environmental restoration. Colorado Assoc. Univ. Press, Boulder, CO.
- Dyksterhuis, E.J. 1949. Condition and management of rangeland based on quantitative ecology. *JRM* 2:104–115.
- Dyksterhuis, E.J. 1958. Ecological principles in range evaluation. *Bot. Rev.* 24:253–272.
- Eldridge, D.J., and S.B. Greene. 1994. Microbiotic soil crusts: A review of their roles in soil and ecological processes in rangelands of Australia. *Australian Journal of Soil Research* 32:389–415.
- Emmick, D.L., and D.G. Fox. 1993. Prescribed grazing management to improve pasture productivity in New York. Cornell University and USDA, Soil Conservation Service, Ithaca, NY.
- Fahey, G.C. 1994. Forage quality, evaluation and utilization. Proceeding from National Conference on Forage Quality, Evaluation and Utilization, Lincoln, NE.
- Farina, M.P.W., P. Channon, and G.R. Thibaud. 2000. A comparison of strategies for ameliorating subsoil acidity. I. Long-Term Growth Effects, *Soil Sci. Soc. Amer. J.* 64:646–651.
- Fehrenbacher, J.B., R.A. Pope, I.J. Jansen, J.D. Alexander, and B.W. Ray. 1978. Soil productivity of Illinois. Univ. Illinois Coop. Ext. Cir. No. 1156.
- Fick, G.W., and R.R. Seaney. 1988. Species selection as applied to pasture. *In* Pasture in the Northeast Region of the United States, Workshop Proceedings. Northeast Regional Agricultural Engineering Service, Ithaca, NY.
- Forage and Grazing Terminology Committee. 1991. Terminology for grazing lands and grazing animals. Pocahontas Press, Blacksburg, VA.
- Forbes, T.D.A. 1988. Researching the plant-animal interface: The investigation of ingestive behavior in grazing animals. *Journal of Animal Science* 66:2369–2379.

- Foy, C.D. 1974. Effects of aluminum on plant growth. *In* The Plant Root and its Environment, Proc. Univ Press of Virginia, Charlottesville, VA, pp. 601–642.
- Foy, C.D. 1997. Tolerance of eastern gamagrass to excess aluminum in acid soil and nutrient solution. *J. Plant Nutrition* 20(9):1119–1136.
- Friedel, M.H. 1988. Range condition and the concept of thresholds. *In* Abstracts of the Third International Rangeland Congress, Nov. 7–11, Vigyan Bhavan, New Delhi, pp. 1–3.
- Friedel, M.H. 1991. Range condition assessment and the concept of thresholds: A viewpoint. *Journal of Range Management*, Vol. 44, No. 5, pp. 422–426.
- Gasbarre, L.C. 1995. Control of gastrointestinal nematodes in dairy cattle under intensive rotational grazing management. SARE Grant Proposal. ARS, Beltsville Agric. Res. Center, Beltsville, MD.
- Gee, C.K., and F. McWilliams. 1972. Irrigated pasture costs and production on the Golden Plains Area of Colorado. Colorado State University Cooperative Extension Service, Fort Collins, CO.
- Geer, I.W. 1996. Glossary of weather and climate. Amer. Meteor. Soc., Boston, MA.
- Gibbens, R.P., J.M. Tromble, J.T. Hennessy, and M. Cardenas. 1983. Soil movement in mesquite duneland and former grasslands of southern New Mexico from 1933 to 1980. *Journal of Range Management* 36:145–148.
- Gilbert, C.F. 1999. Flooding tolerance of eastern gamagrass. Quicksand PMC, USDA-NRCS, Quicksand, Kentucky. *From* Gamagrass Home Page, Gamagrass Seed Co., Falls City, NE.
- Gillette, D.A., and T.R. Walker. 1977. Characteristics of airborne particles produced by wind erosion of sandy soil, High Plains of west Texas. *Soil Science* 123:97–110.
- Gillette, D.A., I.H. Blifford, and D.W. Fryrear. 1974. The influence of wind velocity on the size distributions of aerosols generated by the wind erosion of soils. *Journal of Geophysical Research* 79:4068–4075.
- Gillette, D.A., I.H. Blifford, and I.H. Fenster. 1972. Measurements of aerosol-size distribution and vertical fluxes of aerosols on land subject to wind erosion. *Journal of Applied Meteorology* 11:977–987.
- Graffis, D.W., E.M. Juergenson, and M.H. McVickar. 1985. Approved practices in pasture management. 4th ed., Interstate Printers and Publishers, Inc., Danville, IL.
- Grafton, W.N., A. Ferrise, D. Colyer, D.K. Smith, and J.E. Miller (eds). 1990. Conference proceedings: Income opportunities for the private landowner through management of natural resources and recreational access. West Virginia University Extension Service, Morgantown, WV, 414 pp.
- Grazing Lands Forum. 1987. Multiple use values of grazing lands. Second forum proceedings, October 5–7, 1987, Harpers Ferry, WV, 74 pp.
- Grazing Lands Technology Institute. 1977. Inventorying, classifying, and correlating juniper and pinyon communities to soils in Western United States. USDA, Natural Resourc. Conserv. Serv., Fort Worth, TX.
- Gustine, D.L., and H.E. Flores. 1995. Phytochemicals and health. Vol. 15, Current Topics in Plant Physiology, An ASPP Series, American Society of Plant Physiologists, Rockville, MD.
- Hacker, J.B. (ed). 1981. Nutritional limits to animal production from pastures. Proceedings of an international symposium, St. Lucia, Queensland, Australia, pp. 183–473.
- Hagen, L.J. 1984. Soil aggregate abrasion by impacting sand and soil particles. *Transactions of the American Society of Agricultural Engineering* 27:805–808.

- Hanson, A.A. 1990. Practical handbook of agriculture. CRC Press, Boca Raton, FL.
- Hanson, A.A., and F.V. Juska. 1969. Turfgrass science. Agronomy Monograph No. 14, American Society of Agronomy, Madison, WI.
- Hanson, A.A., D.K. Barnes, and R.R. Hill, Jr. 1988. Alfalfa and alfalfa improvement. American Society of Agronomy, Madison, WI.
- Harper, J.L. 1977. Population biology of plants. Academic Press, New York, NY.
- Hayes, W.A. 1966. When to cut and graze grasses and legumes. Successful Farming Reprint, Meredith Publishing Company, Des Moines, IA.
- Hays, R.L., C. Summers, and W. Seitz. 1981. Estimating wildlife habitat variables. USDI Fish and Wildlife Service, FWS/OBS-81/47.
- Heady, H.F. 1973. Structure and function of climax. In D.N. Hyder (ed.) Arid Shrublands, Proc. Third Workshop U.S./Australia Rangelands Panel. Soc. Range Mgt. Denver, CO.
- Heinrichs, D.H. 1970. Flooding tolerance of legumes. Canadian Journal of Plant Science 50:435-438.
- Hennessy, J.T., B. Kies, R.P. Gibbens, and J.M. Tromble. 1986. Soil sorting by 45 years of wind erosion on a southern New Mexico range. Soil Science Society of America Journal 50: 391-394.
- Hennessy, J.T., R.P. Gibbens, J.M. Tromble, and M. Cordenas. 1983. Vegetation changes from 1935 to 1980 in mesquite dunelands and former grasslands of southern New Mexico. Journal of Range Management 36:370-374.
- Heppner, M.B. 1961. No summer dormancy. The Farm Quarterly 16(2):60-61, 107-108, 110, 112.
- Herrick, J. E., W.G. Whitford, A.G. de Soyza, J.W. Van Zee, K.M. Havstad, C.A. Seybold, and M. Walton. In Press. Soil aggregate stability kit for field-based soil quality and rangeland health evaluations. CATENA.
- Hester, J.W., T.L. Thurow, and C.A. Taylor, Jr. 1997. Hydrologic characteristics of vegetation types as affected by prescribed burning. Journal of Range Management 50:199-204.
- Hodgson, J. 1990. Grazing management: Science into practice. Longman Scientific and Technical, New York, NY.
- Hormay, A.L. 1970. Principles of rest-rotation grazing and multiple-use land management. USDA, Forest Service Training Text-4(2200), 25 pp.
- Hormay, A.L., and M.W. Talbot. 1961. Rest-rotation grazing—A new management system for perennial bunchgrass ranges. USDA, Forest Service Production Research Report No. 15, 43 pp.
- Hoveland, C.S. 1994. Alfalfa grazing management for yield, quality, and persistence. In National Alfalfa Grazing Conference Proceedings, Certified Alfalfa Seed Council, Davis, CA.
- Hrivnak, D. (compiler). 1995. Fee hunting and fishing on private land. U.S. Department of Agriculture, National Agricultural Library, Rural Information Center, Beltsville, MD, 18 pp.
- Hudson, N. 1993. Field measurement of soil erosion and runoff. Food and Agriculture Organization of the United Nations (FAO), Rome, Italy.
- Hughes, H.A. 1980. Conservation farming. Deere and Co., Moline, IL.
- Hughes, H.A. 1982. Crop chemicals. Deere and Co., Moline, IL.
- Hughes, H.D., D.S. Metcalfe, and I.J. Johnson. 1957. Crop production. Macmillan Publ. Co., New York, NY.
- Humphrey, R.R. 1945. Some fundamentals of the classification of range condition. J. Forestry 43:646-647.
- Humphrey, R.R. 1958. The desert grassland, a history of vegetation change and an analysis of causes. Bot. Rev. 24:193-252.

- Hunsaker, C.T., D.E. Carpenter, and J.J. Messer. 1990. Ecological indicators for regional monitoring. *Bulletin of the Ecological Society of America* 71 (3):165–172.
- Hyder, D.N. 1972. Defoliation in relation to vegetative growth. *In* *Biology and Utilization of Grasses*, Academic Press, New York, NY.
- Interagency Technical Reference. 1996. Utilization studies and residual measurements.
- Interagency Technical Reference. 1996. Sampling vegetation attributes.
- Ishler, V.A., et al. 1991. Harvesting and utilizing silage. Penn State University Circular 396. University Park, PA.
- Jarrett, J.A. 1994. Dry cow ration was too high in potassium. *Hoard's Dairyman* 139(12):507.
- Jarrett, J.A. 1996. What we're learning about growing grasses for dry cows. *Hoard's Dairyman* 141(6):224.
- Jewiss, O.R. 1972. Tillering in grasses—Its significance and control. *Journal of the British Grassland Society* 27:65–82.
- Johansen, J.R. 1993. Cryptogamic crusts of semiarid and arid lands of North America. *Journal of Phycology* 28:139–147.
- Johnson, C.W., and N.E. Gordon. 1988. Runoff and erosion from rainfall simulator plots on sagebrush rangelands. *Transactions of the ASAE* 31(2):421–427.
- Jurgens, M.H. 1988. Animal feeding and nutrition. 6th ed., Kendall/Hunt Publishing Co., Dubuque, IA.
- Kabata-Pendias, A., and H. Pendias. 1984. Trace elements in soils and plants. CRC Press, Boca Raton, FL.
- Karlen, D.L., G.E. Varvel, D.G. Bullock, and R.M. Cruse. 1994. Crop rotations for the 21st Century. *In* *Advances in Agronomy*, Vol. 53, Academic Press, San Diego, CA.
- Karr, J. R. 1992. Ecological integrity: Protecting Earth's life support systems. *In* R. Costanza, B.G. Norton, and B.D. Haskell (eds.), *Ecosystem Health-New Goals for Environmental Management*, Island Press, Washington, DC, pp. 223–238.
- Kilgore, E. 1989. Ranch vacations. John Muir Publications, Santa Fe, NM, 344 pp.
- Kilmer, V.J. 1982. Handbook of soils and climate in agriculture. CRC Press, Boca Raton, FL.
- Knight, W.E. 1959. The effect of thickness of stand on distribution of yield and seed production of crimson clover. Mississippi Agricultural Experiment Station Bulletin 583. Mississippi State University.
- Koss, W.J., J.R. Owenby, P.M. Steurer, and D.S. Ezell. 1988. Freeze/frost data. *Climatography of the U.S.* No. 20, Sup. No. 1, Natl. Climatic Data Ctr., Asheville, NC.
- Krausman, P.R. (ed.) 1996. Rangeland wildlife. Society for Range Management, Denver, CO, 440 pp.
- Lackey, R.T. 1998. Ecosystem management: paradigms and prattle, people and prizes. *Renewable Resources Journal* 16:8–13.
- Langer, R.H.M. 1994. Pastures, their ecology and management. Oxford University Press, Auckland 3, New Zealand.
- Lathwell, D.J., and M. Peech. 1973. Interpretation of chemical soil tests. Cornell Experiment Station Bulletin 995, Cornell University, Ithaca, NY.
- Lauenroth, W.K., and W.A. Laycock (eds.). 1989. Secondary succession and the evaluation of rangeland condition. *Westview Special Studies in Agriculture Science and Policy*, Westview Press, 155 pp.
- Laycock, W.A. 1991. Stable states and thresholds of range condition on North American rangelands: A viewpoint. *J. Range Mgt.*, Vol. 44, No. 5, pp. 427–433.
- Levitt, J. 1956. The hardiness of plants. *Agron. Mono.* No. 6, Academic Press, Inc., New York, NY.

- Luthin, J.N. 1957. Drainage of agricultural lands. Agronomy Monograph 7, American Society of Agronomy, Madison, WI.
- Maas, E.V. 1986. Salt tolerance of plants. *Applied Agric. Research* 1(1):12–25.
- Marten, G.C., A.G. Matches, R.F. Barnes, R.W. Brougham, R.J. Clements, and G.W. Sheath. 1989. Persistence in forage legumes. American Society of Agronomy, Madison, WI.
- Martin, J.H. and W.H. Leonard. 1949. Principles of field crop production. Macmillan Publ. Co., New York, NY.
- Matches, A.G. 1973. Anti-quality components of forages. Crop Science Society of America Special Pub. No. 4, Madison, WI.
- Mays, D.A. 1974. Forage fertilization. American Society of Agronomy, Madison, WI.
- McClelland, S.D., D.A. Cleaves, T.E. Bedell, and W.A. Mukatis. 1989. Managing a fee-recreation enterprise on private lands. Oregon State University Extension Service, Extension Circular 1277, 17 pp.
- McIntyre, D.S. 1958. Soil splash and the formation of surface crusts by raindrop impact. *Soil Science* 85:261–266.
- McKee, G.W., J.V. Raelson, W.R. Berti, and R.A. Peiffer. 1982. Tolerance of eighty plant species to low pH, aluminum, and low fertility. Penn State Univ. Agron. Ser. No. 69, University Park, PA.
- Meeker, D.O., Jr., and D.L. Merkel. 1984. Climax theories and a recommendation for vegetation classification: A viewpoint. *J. Range Mgt.*, Vol. 37, No. 5, pp. 427–430.
- Meister Publishing Company. 1993. Plant health guide. 1st ed., Willoughby, OH.
- Meister Publishing Company. 1995. Insect control guide. Vol. 8, Willoughby, OH.
- Metting, B. 1991. Biological surface features of semi-arid lands and deserts. In Skujins, J. (ed.), *Semiarid lands and deserts: Soil resource and reclamation*. Marcel Dekker, New York, NY, pp. 257–293.
- Meyer, B.S., and D.B. Anderson. 1954. Plant physiology. D. Van Nostrand Company, Inc., New York, NY, pp. 618–622.
- Michels, K., D.V. Armbrust, B.E. Allison, and M.V.K. Sivakumar. 1995. Wind and windblown sand damage to pearl millet. *Agronomy Journal* 87:620–626.
- Millar, C.E., and L.M. Turk. 1954. Fundamentals of soil science. 2nd ed., John Wiley and Sons, New York, NY.
- Morgan, R.P.C. 1986. Soil erosion and conservation. D.A. Davidson, (ed.), Longman Scientific and Technical, Wiley and Sons Press, New York, NY.
- Morrison, F.B. 1959. Feeds and feeding. 23 Ed. The Morrison Publ. Co., Clinton, IA.
- Moser, L.E., D.R. Buxton, and M.D. Casler. 1996. Cool-season forage grasses. Agronomy Monograph No. 34, American Society of Agronomy, Madison, WI.
- Murphy, B. 1991. Greener pastures on your side of the fence. 2nd ed., Arriba Publishing, Colchester, VT.
- National Academy of Sciences. 1975. Nutrient requirements of sheep. Publ. No. 5, Washington, DC.
- National Academy of Sciences. 1976. Nutrient requirements of beef cattle. Publ. No. 4, Washington, DC.
- National Oceanic and Atmospheric Administration, National Climatic Data Center. 1997. U.S. national 1961–1990 climate normals. *Climatology of the U. S.* No. 20, Sta. Climatol. Summ., Asheville, NC.
- National Research Council. 1988. Nutrient requirements for dairy cattle. 6th rev. ed., National Academy Press, Washington, DC.

- Nevada Range Studies Task Group. 1984. Nevada rangeland monitoring handbook. U.S. Gov. Printing Office:1985-587-052/20001.
- Olson, B.E. 1999. Impacts of noxious weeds on ecological and economic systems. *In* Sheley, R.L. and J.K. Petroff (eds.), *Biology and management of noxious rangeland weeds*. Oregon State University Press, Corvallis, OR, pp. 4–18.
- Oregon State University. 1987. Developing profitable resource-based recreation on private land. Proceedings 1987 Pacific Northwest Range Management Short Course, Corvallis, OR, 177 pp.
- Pellant, M. 1996. Use of indicators to qualitatively assess rangeland health. N.E. West (ed.) *Rangelands in a Sustainable Biosphere*, Proc. 5th International Rangeland Congress. Society for Range Management, Denver, CO, pp. 434–435.
- Pellant, M., P. Shaver, D. Pyke, and J. Herrick. In Press. Interpreting indicators of rangeland health, Ver. 3.0. USDI Bureau of Land Management. Denver, CO.
- Perfect, E., R.D. Miller, and B. Burton. 1988. Frost upheaval of overwintering plants: a quantitative field study of the displacement process. *Arctic and Alpine Research* 20:70–75.
- Peterson, M.L., and R.M. Hagan. 1952. Irrigation principles and practices for pastures. *In* Sixth International Grassland Congress Proceedings, Vol. 1:397–403.
- Pierson, F.B., W.H. Blackburn, S.S. Van Vactor, and J.C. Wood. 1994. Partitioning small scale spatial variability of runoff and erosion on sagebrush rangeland. *Water Resources Bull.* 30:1081–1089.
- Pimm, S.L. 1984. The complexity and stability of ecosystems. *Nature* 307:321–326.
- Piper, C.V., and L.H. Bailey. 1941. *Forage plants and their culture*. Macmillan Publ. Co., New York, NY.
- Pitt, R.E. 1990. *Silage and hay preservation*. Northeast Regional Agricultural Engineering Service, Ithaca, NY.
- Pomeroy, L.R., E.C. Hargrove, and J.J. Alberts. 1988. The ecosystem perspective. *In* *Concepts of Ecosystem Ecology*, Ecological Studies, Vol. 67, Springer-Verlag, New York, NY.
- Portz, H.L. 1967. Frost heaving of soil and plants. Incidence of frost heaving of forage plants and meteorological relationships. *Agronomy Journal* 59:341–344, Am. Soc. of Agronomy, Madison, WI.
- Prairie Agricultural Machinery Institute. 1996. *The stockmans guide to range livestock watering from surface water sources*. Prairie Agricultural Machinery Institute, Portage la Prairie, Manitoba, Canada.
- Pye, K. 1987. *Aeolian dust and dust deposits*. Academic Press. San Diego, CA.
- Pyenson, L.L. 1951. *Elements of plant protection*. John Wiley and Sons, New York, NY.
- Pyke, D.A. 1995. Population diversity with special reference to rangeland plants. *In* N.E. West, (ed.), *Biodiversity of rangelands*. Natural Resources and Environmental Issues, Vol. IV, College of Natural Resources, Utah State University, Logan, UT, pp. 21–32.
- Quansah, C. 1985. The effect of soil type, slope, flow rate, and their interactions on detachment by overland flow with and without rain. *In* P.D. Jungerius (ed.), *Soils and Geomorphology*, Catena Supplement 6, Catena Verlag, Germany, pp 19–28.
- Rapport, D.J., C. Gaudet, J.R. Karr, J.S. Baron, C. Bohlen, W. Jackson, B. Jones, R.J. Naiman, B. Norton, and M.M. Pollock. 1998. Evaluating landscape health: Integrating societal goals and biophysical process. *Journal of Environmental Management* 53:1–15.
- Rayburn, E.B. 1987. *Pasture management facts and figures for New York*. Seneca Trail Resource Conservation and Development Council, Franklinville, NY.

- Reinhart, R. 1990. Alfalfa management/diagnostic guide. Pioneer Hi-Bred International, Des Moines, IA.
- Rhoades, E.D. 1964. Inundation tolerance of grasses in flooded areas. *In* Transactions of the ASAE 7:(2)164–166, 169, American Society of Agricultural Engineers, Saint Joseph, MI.
- Rhoades, J.D., and J. Loveday. 1990. Salinity in irrigated agriculture. *In* Agronomy Monograph No. 30, Irrigation of agricultural crops, B.A. Stewart and D.R. Nielsen (eds.), Amer. Soc. Agron., Madison, WI, pp. 1,091–1,131.
- Robinson, W.L., and E.G. Bolen. 1989. Wildlife ecology and management. Macmillan Publ. Co., New York, NY, 574 pp.
- Rollins, D. (ed). 1988. Recreation on rangelands: Promise, problems, projections. Society for Range Management, Symposia proceedings, February 23, 1988, Corpus Christi, TX, 82 pp.
- Ross, T. 1999. Mean number of days with precipitation .01 inch or more. Comparative Climatic Data Table, NOAA, Natl. Climatic Data Ctr., Asheville, NC.
- Ross, T. 1999. Cloudiness—mean number of days. Comparative Climatic Data Table, NOAA, Natl. Climatic Data Ctr., Asheville, NC.
- Ross, T. 1999. Average relative humidity (%). Comparative Climatic Data Table, NOAA, Natl. Climatic Data Ctr., Asheville, NC.
- Sanchez, P.A., W. Couto, and S.W. Buol. 1982. The fertility capability soil classification system: Interpretation, applicability, and modification. *Geoderma* 27:283–309.
- Scheaffer, C.C., R.D. Mathison, N.P. Martin, D.L. Rabas, H.J. Ford, and D.R. Swanson. 1993. Forage legumes: clovers, birdsfoot trefoil, cicer milkvetch, crownvetch, sainfoin, and alfalfa. Station Bulletin 597, Minnesota Agricultural Experiment Station, Saint Paul, MN.
- Semple, A.T., and T.E. Woodward. 1946. A pasture handbook. USDA Miscellaneous Publication 194, U.S. Gov. Printing Office, Washington, DC.
- Serotkin, N., ed. 1994. The Penn State agronomy guide, 1995–1996. Pennsylvania State University. University Park, PA.
- Shaw, B.T. 1952. Soil physical conditions and plant growth. Agronomy Monograph No. 2, Academic Press, New York, NY.
- Shiflet, T.N. 1973. Range sites and soils in the United States. *In* Proceedings of the Third Workshop of the United States/Australia Rangelands Panel. Tucson, AZ, March 26–April 5, pp. 23–33.
- Singer, M.J. 1991. Physical properties of arid region soils. *In* Skujins, J. (ed.), Semiarid lands and deserts: soil resource and reclamation, Marcel Dekker, New York, NY, pp. 81–109.
- Singer, M.J., and D.N. Manns. 1987. Soils, an introduction. Macmillan Publ., New York, NY.
- Smith, D. 1975. Forage management in the north. 3rd Ed., Kendall/Hunt Publ. Co., Dubuque, IA.
- Smith, D.D., and W.H. Wischmeier. 1962. Rainfall erosion. *Advances in Agronomy* 14:109–148.
- Smith, E.L. 1988. Successional concepts in relation to range condition assessment. *In* P.T. Tueller (ed.), Vegetation Science Applications for Rangeland Analysis and Management, Kluwer Academic Publishers, Boston, MA, pp. 113–133.
- Smith, E. Lamar. 1999. The myth of range/watershed health. *In* Riparian and watershed management in the interior northwest: An interdisciplinary perspective. Oregon State University Extension Service Special Report 1001, Corvallis, OR, pp. 6–11.
- Snedecor, G.W., and W.G. Cochran. 1980. Statistical methods. Iowa State College Press, Ames, IA.
- Society for Range Management. 1989. A glossary of terms used in range management. Denver, CO, 20 p.

- Solbrig, O.T., E. Medina, and J.F. Silva. 1996. Biodiversity and savanna ecosystem processes: A global perspective. Springer, New York, NY.
- Sprague, M.A., and M.M. Hoover. 1963. Seedling management of grass-legume associations in the northeast. Northeast Regional Publication No. 42, New Jersey Agricultural Experiment Station, Rutgers, New Brunswick, NJ.
- Steel, R.G.D., and J.H. Torrie. 1980. Principles and procedures of statistics. McGraw-Hill Book Co., New York, NY.
- Steurer, P.M. 1999. Data documentation for TD 9641 daily normal growing degree units to selected base temperatures 1951–1980. National Climatic Data Center, Asheville, NC.
- Stoddard, L.A., A.D. Smith, and T.W. Box. 1975. Range management. McGraw-Hill Book Company.
- Stringham, T.K., W.C. Krueger, and P.L. Shaver. 2001. States, transitions, and thresholds: Further refinement for rangeland applications. Oregon Agric. Exp. Sta. Spec. Rep. 1024, Oregon State Univ., Corvallis.
- Sumner, M.E. 1993. Gypsum and acid soils: the world scene. *In* Advances in Agronomy, Vol. 51, D.L. Sparks, (ed.), Academic Press, Inc., New York, NY, pp. 1–32.
- Tanji, K.K. 1990. Agricultural salinity assessment and management. ASCE Manual No. 71, American Society of Civil Engineers, New York, NY.
- Task Group on Unity in Concepts and Terminology. 1995. New concepts for assessment of rangeland condition. *Journal of Range Management* 48:271–282.
- Taylor, N.L. 1985. Clover science and technology. American Society of Agronomy, Madison, WI.
- Thorne, D.W., and W.H. Bennett. 1952. Soil management for grasslands on irrigated salted soils. *In* Sixth International Grassland Congress Proceedings, Vol. 1:805–812.
- Thurow, T.L., W.H. Blackburn, and C.A. Taylor, Jr. 1986. Hydrologic characteristics of vegetation types as affected by livestock grazing systems, Edwards Plateau, Texas. *Journal of Range Management* 39:505–509.
- Thurow, T.L., W.H. Blackburn, and C.A. Taylor, Jr. 1988. Infiltration and interrill erosion responses to selected livestock grazing strategies, Edwards Plateau, Texas. *Journal of Range Management* 41:296–302.
- Thurow, T.L., W.H. Blackburn, and C.A. Taylor, Jr. 1988. Some vegetation responses to selected livestock grazing strategies, Edwards Plateau, Texas. *Journal of Range Management* 41:108–114.
- Tilman, D., and J.A. Downing. 1994. Biodiversity and stability in grasslands. *Nature* 367:363–367.
- Tilman, D., J. Knops, D. Wedin, P. Reich, M. Ritchie, and E. Siemann. 1997. The influence of functional diversity and composition on ecosystem processes. *Science*, Vol. 277:1300–1302.
- Tisdale, S.L., W.L. Nelson, and J.D. Beaton. 1985. Soil fertility and fertilizers. 4th ed., Macmillan Publ. Co., New York, NY.
- Toma, M., M.E. Sumner, G. Weeks, and M. Saigusa. 1999. Long-term effects of gypsum on crop yield and subsoil chemical properties. *Soil Sci. Soc. Amer. J.* 63:891–895.
- Tongway, David. 1994. Rangeland soil condition assessment manual. CSIRO. Div. Wildlife and Ecology, Canberra.
- Undersander, D.J., B. Albert, P. Porter, and A. Crossley. 1991. Wisconsin pastures for profit: A hands-on guide to rotational grazing. A3529. University of Wisconsin-Extension, Madison, WI.
- Undersander, D.J., R.R. Smith, K. Kelling, J. Doll, G. Worf, J. Wedberg, J. Peters, P. Hoffman, and R. Shaver. 1990. Red clover: Establishment, management, and utilization. A3492, University of Wisconsin-Extension, Madison, WI.

- United States Department of Agriculture. 1942. Keeping livestock healthy. Yearbook of Agriculture, U.S. Gov. Printing Office, Washington, DC.
- United States Department of Agriculture. 1955. Water, the yearbook of agriculture. U.S. Gov. Printing Office, Washington, DC.
- United States Department of Agriculture. 1994. Agricultural statistics. U.S. Gov. Printing Office, Washington, DC.
- United States Department of Agriculture, Natural Resources Conservation Service. 1996. National soil survey handbook. Issue 4, U.S. Gov. Printing Office, Washington, DC.
- United States Department of Agriculture, Natural Resources Conservation Service. 1997. National forestry manual. Washington, DC.
- United States Department of Agriculture, Natural Resources Conservation Service. 1997. National range and pasture handbook. Washington, DC.
- United States Department of Agriculture, Natural Resources Conservation Service. 1998. Field office guide to climatic data. Natl. Water and Climate Ctr., Portland, OR.
- United States Department of Agriculture, Soil Conservation Service. 1976. National range handbook. Washington, DC.
- United States Department of Agriculture, Soil Conservation Service. 1981. Land resource regions and major land resource areas of the United States. Agricultural Handbook 296, United States Government Printing Office, Washington, DC.
- United States Department of Agriculture, Soil Conservation Service. 1994. Summary report, 1992 national resources inventory. Washington, DC.
- United States Department of Commerce, Economics and Statistics Administration and Bureau of the Census, and United States Department of the Interior, Fish and Wildlife Service. 1993. 1991 national survey of fishing, hunting, and wildlife-associated recreation. Issued March 1993, 124 pp.
- United States Department of the Interior, Bureau of Land Management. 1973. Determination of erosion condition class. Form 7310-12, Washington DC.
- United States Department of the Interior, Bureau of Land Management. 1993. Riparian area management: Process for assessing proper functioning condition. Technical Reference 1737-9, Service Center, Denver, CO.
- United States Department of the Interior, Bureau of Land Management. 1996. Sampling vegetation attributes. National Applied Resource Science Center Report BLM/RS/ST-96/002+1730, 163 p.
- Vallentine, J.F. 1990. Grazing management. Academic Press, San Diego, CA.
- Wagner, R.E. 1989. History and development of site and condition criteria in the Bureau of Land Management. *In* W.K. Lauenroth and W.A. Laycock (eds.), Secondary Succession and the Evaluation of Rangeland Condition, Westview, Boulder, CO, pp. 35–48.
- Waldren, R.P., and A.D. Flowerday. 1982. Introductory crop science. Burgess Publ. Co., Minneapolis, MN, pp. 142–155.
- Waller, S.S., L.E. Moser, and P.E. Reece. 1985. Understanding grass growth: The key to profitable livestock production. Trabon Printing Company, Kansas City, MO.
- Waltman, W.J., E.J. Ciolkosz, M.J. Mausbach, M.D. Svoboda, D.A. Miller, and P.J. Kolb. 1997. Soil climate regimes of Pennsylvania. Penn State Agric. Exp. Sta. Bul. No. 873.
- Webb, D.W. 1994. Dairy science handbook. Dairy Science Department, University of Florida.
- West, N.E., K. McDaniel, E.L. Smith, P.T. Tueller, and S. Leonard. 1994. Monitoring and interpreting ecological integrity on arid and semi-arid lands of the Western United States. Report 37, New Mexico State University, New Mexico Range Improvement Task Force.

- Westoby, M., B. Walker, and I. Noy-Meir. 1989. Opportunistic management for rangelands not at equilibrium. *J. Range Mgt.* 42:266–274.
- Wheeler, W.A. 1950. Forage and pasture crops. D. Van Nostrand Company, New York, NY.
- White, J. 1979. The plant as a metapopulation. *Annual Review of Ecology and Systematics* 10:109–145.
- Whitford, W.G. 1988. Decomposition and nutrient cycling in disturbed arid ecosystems. *In* E.B. Allen (ed.), *The reconstruction of disturbed arid lands*, American Association for the Advancement of Science, Westview Press, Boulder, CO, pp. 136–161.
- Whitford, W.G. 1996. The importance of the biodiversity of soil biota in arid ecosystems. *Biodiversity and Conservation* 5:185–195.
- Whittaker, R.H. 1975. *Communities and ecosystems*, 2nd edition. Macmillan, New York, NY.
- Wicklum, D., and R.W. Davies. 1995. Ecosystem health and integrity. *Canadian Journal of Botany* 73:997–1000.
- Wiens, J.A. 1984. On understanding a non-equilibrium world: Myth and reality in community patterns and processes. *In* *Ecological Communities: Conceptual Issues and the Evidence*, Princeton University Press, Princeton, NJ.
- Wild, A. 1988. *Russells soil conditions and plant growth*. 11th ed., Longman Scientific and Technical, New York, NY.
- Wood, M.K., and W.H. Blackburn. 1984. Vegetation and soil responses to cattle grazing systems in the Texas Rolling Plains. *Journal of Range Management* 37:303–308.
- Workman, J.P. 1987. *Range economics*. Macmillan Publ. Co., NY. 217 pp.
- Worthen, E.L., and S.R. Aldrich. 1956. *Farm soils, their fertilization and management*, 5th ed., John Wiley and Sons, New York, NY.

Glossary

Terms used in the Grazing Land Applications (GLA) software are identified by a (GLA) after the term name.

Abbreviations used in this glossary:

Abbr.	abbreviation
e.g.	for example
i.e.	in other words
Syn.	Synonym
n.	Noun
v.	Verb
vi.	Verb intransitive
vt.	Verb transitive

Abiotic	Nonliving components of an ecosystem; basic elements and compounds of the environment.
Accelerating practices	Practices that supplement vegetative management; help to achieve desired changes in the plant community more rapidly than is possible through vegetative management alone. Included are such practices as seeding, prescribed burning, brush management, and certain other practices that accelerate vegetative change. See Facilitating practices.
Accessibility	The ease with which an area can be reached by people or penetrated and grazed by animals. The ease with which herbivores can reach plants or plant parts.
Acid soil	A soil that has a pH below 6.6.
Adjustment (GLA)	Change in animal numbers, seasons of use, kinds or classes of animals, or management practices as warranted by specific conditions.
Adjustment factor (GLA)	A value used to adjust the recommended stocking rate for landscape attributes that limit capture of forage, such as distance to water, slope, barriers, terrain, or site preference.
Aftermath	Crop residue and/or regrowth of forage crops, including growth of volunteer plants, used for grazing after a machine harvest.
Age-class	(1) A descriptive term to indicate the relative age of plants. (2) Refers to age and class of animal.
Air-dry weight	The weight of a substance, usually vegetation, after it has been allowed to dry to equilibrium with the atmosphere, usually without artificial heat.
Alkaline soil	A soil that has a pH above 7.3.

Alkaloids	Bitter tasting organic compounds of plant origin that have alkaline properties and a complex molecular structure containing nitrogen. They reduce dry matter intake and interfere with digestion of livestock grazing forages containing significant levels of them. Metabolic and reproductive disorders in livestock can occur from ingestion of the more toxic alkaloids. They are anti-quality chemicals.
Allelopathy	Chemical inhibition of one organism by another.
Allotment	An area designated for the use of a prescribed number and kind of livestock under one plan of management.
Allowable use	(1) The degree of utilization considered desirable and attainable on various parts of a ranch or allotment considering the present nature and condition of the resource, management objectives, and levels of management. (2) The amount of forage planned to be used to accelerate range improvement.
Alluvium	Sediment deposited by streams and rivers.
Amortizing	The process of paying initial costs plus subsequent interest costs over a payment period, usually in equal periodic installments.
Anabolic stimulant (GLA)	Growth hormones that affect the metabolic efficiency of an animal at the cellular level.
Anhydrous ammonia	A nitrogen fertilizer that is 82 percent nitrogen. It is stored in pressurized tanks and injected into the soil to prevent loss to the air. Great care must be taken during application to avoid exposure to a vapor cloud of the ammonia. It is extremely toxic and can cause significant damage to eyes, nasal passages, and lungs.
Animal attributes (GLA)	A listing of major domestic and wild animal species, major animal classes, and breed attributes.
Animal class (GLA)	Age and/or sex groups of a kind of animal (e.g., cow, bull, calf, weaner steer, weaner heifer, yearling steer, yearling heifer, 2-year old heifer, 3-year old heifer, ox).
Animal-day	One day's tenure upon grazing land by one animal. Most specify kind and class of animal. Not synonymous with animal unit day.
Animal-demand	Energy requirement of ungulate herbivores based only on animal-related factors, such as body size, stage of life cycle, or production stage.
Animal kind (GLA)	The common name of a kind or species of animal (e.g., cattle, sheep, goat, horse, white-tailed deer).
Animal-month	A month's tenure upon grazing land by one animal. Must specify kind and class of animal. Not synonymous with animal-unit month.

Animal substitution ratio	A numerical ratio of numbers, units or stocking levels of one animal species to another or in partitioning grazing capacity between two or more animal species.
Animal-unit	An animal unit (AU) is one mature cow of approximately 1,000 pounds and a calf up to weaning, usually 6 months of age, or their equivalent.
Animal-unit-day	The amount of forage required by an animal unit for 1 day. The NRCS uses 30 pounds of air dry forage or 26 pounds of oven dried forage per day as the amount of feed needed to meet this requirement. The pounds of feed needed to meet an animal's daily requirement is usually calculated by taking 2.5 to 3 percent of the animal's body weight.
Animal-unit-equivalent	The amount of forage consumed by the different kind and class of animals expressed as a portion of an animal unit.
Animal-unit-month	The amount of forage required by an animal unit for 1 month.
Animal-unit-year	The amount of forage required by an animal unit for 1 year, equal to 12 AUM's. The NRCS uses 9,490 pounds of oven dried forage as required pounds of forage to equal an animal unit year.
Annual plant	A plant that completes its life cycle and dies in 1 year or less.
Annual range	Range on which the principal forage plants are self-perpetuating annual, herbaceous species.
Anti-quality chemicals	Chemicals produced in some forages that reduce dry matter intake or cause negative responses in animals consuming those forages.
Apical dominance	Domination and control of meristematic leaves or buds located on the lower stem, roots, or rhizomes by hormones produced by apical meristems located on the tips and upper branches of plants, particularly woody plants.
Apparent trend	An interpretation of trend based on a single observation. Apparent trend is described in the same terms as measured trend except that when no trend is apparent it shall be described as not apparent.
Aquifer	A geologic formation capable of transmitting water through its pores at a rate sufficient for water supply purposes. The term water-bearing is sometimes used synonymously with aquifer when a stratum furnishes water for a specific use. Aquifers are usually saturated sands, gravel, fractures, caverns, or vesicular rock.
Arid	A term applied to regions or climates where lack of sufficient moisture severely limits growth and production of vegetation. The limits of precipitation vary considerably according to temperature conditions, with an upper annual limit for cool regions of 10 inches or less and for tropical regions as much as 15 to 20 inches. See Semiarid.

Arroyo	A ravine in southwestern United States.
Ash (GLA)	The noncombustible portion of feedstuff, generally nonvolatile minerals.
Ash	The remaining residue after all the combustible material from a feed stuff has been burned off in a furnace at 500 to 600 °C. Nutritionally ash values have little importance.
Aspect	The predominant direction of slope of the land.
Association	Syn. Plant association.
AU	Abbr. for Animal-unit. (Usually no periods)
AUM	Abbr. for Animal-unit-month. (Usually no periods)
Autecology	A subdivision of ecology that deals with the relationship of individuals of a species to their environment.
Autogate	See cattleguard.
Autotoxicity	A specific type of allelopathy where the presence of adult plants of a species interferes with the germination and development of seedlings from that species.
Auxin	A plant hormone promoting or regulating growth.
AUY	Abbr. for animal-unit-year. (Usually no periods)
Available forage	(Animal oriented.) That portion of the forage production that is accessible for use by a specified kind or class of grazing animal. (Plant and animal oriented.) It is the consumable forage stated in digestible dry matter per land unit area that can be removed by grazing livestock without damage to the forage plants. See Usable forage; same except stated as dry matter per land unit area.
Available water	The portion of water in a soil that can be absorbed by plant roots.
Available water holding capacity	The volume of water available to plants when the soil including fragments is at field capacity.
Azonal soil	A soil lacking a well-defined profile.
Backfiring	Ignition of a fire on the leeward (downwind) side of a burn area, resulting in a slow moving ground fire that backs into the wind.
Bactericide	A pesticide that kills bacteria.

Bag silo (plastic tube)	Long (95 to 135 feet) plastic bags ranging from 8 to 10 feet in diameter that hold silage or haylage. They are filled with a wheeled machine that holds the open end of the bag and stuffs the bag with moist to wet forage. The machine is moved forward as the bag fills. For best forage quality, storage should be during cool weather and not exceed 5 months.
Balage	Round baled, 40 to 60 percent moisture, grass or legume forage completely wrapped in plastic film or bagged. For best forage quality, storage should be during cool weather, in a shaded area, and not exceed 5 months.
Balanced operation	(1) A livestock enterprise that provides sufficient feed and forage resources during each season to promote continuous satisfactory maintenance and production of its livestock and game. (2) An operation that integrates the kinds, classes, and numbers of animals (livestock or wildlife) to effectively use available forage resources to maintain continuous, sustainable production. (3) An operation that integrates various livestock, wildlife, and recreational enterprises which most effectively uses available forages and other range resources to maintain continuous, sustainable production.
Baler	A machine that picks up a windrow of forage, compresses it, forms it into a rectangular or cylindrical bale, wraps it, and discharges it either onto the ground or into a trailing, convenient hauling vehicle. Bale size is highly variable among models.
Band	Any number of sheep handled as a unit attended by a herder. See Flock.
Band-day	Tenure by a band of sheep of a given size and class for 1 day.
Bare ground	All land surface not covered by vegetation, rock, or litter. See Ground cover.
Barren	(1) Any area devoid of vegetation or practically so. (2) A term to describe a mature female animal that is incapable of producing offspring.
Barrier	A physical obstruction that limits movement.
Basal area	The cross sectional area of the stem or stems of a plant or of all plants in a stand. Herbaceous and small woody plants are measured at or near the ground level; larger woody plants are measured at breast or other designated height. Syn. basal cover.
Bed ground	An area where animals sleep and rest.
Bench mark	(1) A permanent reference point. (2) In range inventory, it is used as a point where changes in vegetation through time are measured. (3) In soils, it is used to designate a major soil series that is representative of similar soils. (4) In economics, data that are used as a base for comparative purposes with similar data. (5) A surveyor's mark made on a permanent landmark that has known position and altitude.

Biennial	A plant that lives for 2 years, producing vegetative growth the first year, usually blooming and fruiting in the second year, and then dying.
Biocide	A chemical toxic or lethal to living organisms.
Biodegradable	Capable of being decomposed by natural processes.
Biological diversity	The variety and variability of the world's organisms, the ecological complexes in which they occur, and the processes and life support services they mediate.
Biomass	The total amount of living plants and animals above and/or below ground in an area at a given time.
Biome	A major biotic unit consisting of plant and animal communities having similarities in form and environmental conditions, but not including the abiotic portion of the environment.
Biota	All the species of plants and animals occurring within an area or region.
Biotype	A group of individuals within a population occurring in nature, all with essentially the same tolerance ranges. A species usually consists of many biotypes. See Ecotype.
Bi-pass protein	Protein that bypasses or escapes the rumen directly into the intestine, such as dehydrated alfalfa, blood meal, corn gluten meal, distillers grains, and feather meal.
Blackline	A backfired area in front of the head fire used for stopping the head fire. Its area (length and width) is determined by the fuel load and risk. Can be burned in advance of prescribed fire. See Firebreak.
Blowout	(1) An excavation in an area of soil, usually loose sand, produced by wind. (2) A breakthrough or rupture of a soil surface attributable to hydraulic pressure, usually associated with sand boils.
Body condition score (BCS) (GLA)	A rating system used to evaluate the overall health and well being of livestock has become a widely used method of determining when supplemental feeding should be used. A BCS of 5 usually indicates an animal in average condition. BCS systems usually go from 1 to 9 or 10, with 1 being extremely poor and 9 or 10 being excessively fat.
Boot stage	Growth stage when a grass seedhead is enclosed by the sheath of the uppermost (flag) leaf.
Bovine fat necrosis	Several physiological disorders in cattle caused by necrotic or hard fat lesions in the abdominal cavity. Ingestion of highly fertilized endophyte fungus infected tall fescue seems to cause the disorder.

Brand	(1) (v) To mark the skin or wool of an animal in a distinctive pattern by use of a hot or cold iron, chemical, paint, or other means to designate ownership or to identify individual animals for registration or management purposes. (2) (n) The mark so made.
Breeding herd	The animals retained for breeding purposes to provide for the perpetuation of the herd or band. Excludes animals being prepared for market.
Breed type (GLA)	Name of the breed (e.g., Hereford cattle, merino sheep).
Broadcast seeding	Process of scattering seed on the surface of the soil prior to natural or artificial means of covering the seed with soil.
Browse	(n) That part of leaf and twig growth of shrubs, woody vines, and trees available for animal consumption. (v) Act of consuming browse.
Browse line	A well-defined height to which browse has been removed by animals.
Browseway	A lane built through a dense brush thicket to provide access by herbivores and people and/or to encourage browse rejuvenation. See Sendero.
Brush	Various species of shrubs or small trees usually considered undesirable for livestock or timber management. The same species may have value for browse, wildlife habitat, or watershed protection.
Brush control	Reduction of unwanted woody plants through fire, chemicals, mechanical methods, or biological means to achieve desired land management goals.
Brushland	An area covered primarily with brush; i.e., shrubland.
Brush management	Manipulating woody plant cover to obtain desired quantities and types of woody cover and/or to reduce competition with herbaceous understory vegetation, in accordance with overall resource management objectives.
Buck pasture	In certain localities, a pasture or paddock for holding rams separately from ewes.
Bucking range	In certain localities, range selected for placing rams with ewes.
Buffalo wallow	A small natural depression of prairie occasionally containing standing water and having vegetation different from that of the surrounding area.
Buildup or corrective fertilizer applications	Nutrient additions, especially phosphorus and potassium, that bring the soil up to the desired level of availability for optimum plant growth.
Bunch grass	A grass so-called because of its characteristic growth habit of forming a bunch.

Bunker or horizontal silo	Above- or below-ground, lined or unlined storage facility used to store fermented forage material (silage or haylage). Forage material must be machine compacted and covered with an air tight film of plastic to get proper fermentation and reduce storage losses. Unlined ones can leak silage effluent, a pollutant with high biochemical oxygen demand.
Burn	An area over which fire has recently passed.
Butte	An isolated hill with relatively steep sides. See Mesa.
C-3 plant	A plant employing the pentose phosphate pathway of carbon dioxide assimilation during photosynthesis; a cool-season plant.
C-4 plant	A plant employing the dicarboxylic acid pathway of carbon dioxide assimilation during photosynthesis; a warm-season plant.
Cabling	The use of a large cable pulled between two large tractors (usually crawler tractors) to pull down or uproot brush. See Chaining.
Cactus	A spiny, succulent plant of the Cactaceae family.
Calf crop	The number of calves weaned from a given number of cows exposed to breeding, usually expressed in percent; i.e., number of calves weaned divided by number of cows exposed x 100. Calves weaned.
Caliche	(1) A layer in the soil horizon more or less cemented by secondary carbonates of calcium or magnesium precipitated from the soil solution. It may occur as a soft, thin soil horizon; as a hard, thick bed just beneath the solum; or as a surface layer exposed by erosion. Often used for road material or as a filler to build up areas in heavily traveled areas, such as pens or troughs. Not a geologic deposit. (2) Alluvium cemented with sodium nitrate, chloride, and/or other soluble salts.
Calorie	The amount of heat required to raise the temperature of 1 gram of water 1 °C measured from 14.5 to 15.5 °C.
Cam plant	A plant employing the crasulacean acid metabolism pathway of carbon dioxide assimilation during photosynthesis.
Canopy	(1) The vertical projection downward of the aerial portion of vegetation, usually expressed as a percent of the ground so occupied. (2) A generic term referring to the aerial portion of vegetation.
Canopy cover	The percentage of ground covered by a vertical projection of the outermost perimeter of the natural spread of foliage of plants. Small openings within the canopy are included. Syn. crown cover.
Carrier	(1) Material used to dilute the active ingredient in a chemical formulation. (2) Material used to carry a pesticide to its target. (3) Plant or animal carrying an infectious disease agent internally, but showing no marked symptoms.

Carrying capacity	The maximum stocking rate possible without inducing permanent or long-term damage to vegetation or related resources. The rate may vary from year to year in the same area as a result of fluctuating forage production.
Catchment basin	See Guzzler.
Cation exchange capacity	The amount of exchangeable cations that a soil can adsorb at pH 7.0.
Cattleguard	A device or structure, at points where roads or railroads cross a fence line, that is so designed that vehicular travel is uninterrupted, but crossing by all kinds of livestock is restricted. Syn. autogate.
Cattle walkway	Syn. walkway.
Cell	A grazing arrangement comprised of numerous subdivision (pastures or paddocks) often formed by electrical fencing, with a central management to facilitate livestock management and movement to the various subdivisions. Normally used to facilitate a form of short duration grazing.
Certified seed	Seed produced from foundation or registered seed that is available for consumer use. It carries a tag signifying it is high quality seed.
Chaining	Similar practice as cabling except a large ship anchor chain with each chain link weighing 80 to 100 pounds is used. See Cabling.
Chaparral	(1) A shrub community. (2) A dense thicket of stiff or thorny shrubs or dwarf trees, common to the Southwest United States.
Chiseling	Breaking or loosening the soil, without inversion, with a chisel cultivator or chisel plow. A practice used for grassland or pasture renovation.
Class of animal	Description of age and/or sex-group for a particular kind of animal; e.g., cow, calf, yearling, ewe, doe, or fawn.
Claypan	A dense compact layer in the subsoil having a much higher clay content than the overlying material from which it is separated by a sharply defined boundary; formed by downward movement of clay or by synthesis of clay in place during soil formation. Claypans are usually hard when dry and plastic and sticky when wet. They usually impede the movement of water and air. See Hardpan.
Climax	See Historic climax plant community.
Climax plant community	Syn. historic climax plant community.
Clone	A group of plants, growing in close association, derived by asexual reproduction from a single parent plant. Such plants are therefore of the same genetic constitution.
Closed range	Any range on which livestock grazing or other specified use is prohibited. See Livestock exclusion.

Close herding	Handling a herd in a closely bunched manner, restricting the natural spread of the animals when grazing. See Mob stocking.
Co-grazing	Grazing the current year's forage production by more than one kind of grazing animal either at the same time or at different seasons.
Cold stratification	Keeping seed in a cool, moist environment for a period of time to simulate overwintering thereby reducing dormancy and increasing seed germination.
Commercial	(1) Livestock raised primarily for meat, milk, wool, or other animal-derived products. (2) The label applied to a producer of such animals. See Seedstock for contrasting term.
Common use	(1) Grazing the current year's forage production by more than one kind of grazing animal either at the same time or at different seasons. (2) More than one operator running livestock on the same area at the same time.
Community (plant community)	An assemblage of plants occurring together at any point in time, while denoting no particular ecological status. A unit of vegetation.
Community	An assemblage of populations of plants and/or animals in a common spatial arrangement.
Community type	An aggregation of all plant communities distinguished by floristic and structural similarities in both overstory and undergrowth layers. A unit of vegetation within a classification.
Companion crop	A crop sown with another crop (i.e., perennial forage) that is allowed to mature and provide a return in the first year.
Competition	A process of struggling between or among organisms of the same species (intraspecific) or different species (interspecific) for light, water, essential elements, or space within a trophic level, resulting in a shortage of essential needs for some individuals or groups.
Complementary pasture	Short-term forage crop or perennial pasture used for special purposes, to extend grazing seasons, or to enhance productivity of the ranch.
Composition	Syn. Species composition.
Concentrate (GLA)	A feed or feed mixture for livestock that usually contains less than 18 percent crude fiber.
Concentrate feed	Grains or their products and other processed food materials that contain a high proportion of nutrients and are low in fiber and water.
Concentrates	Feeds low in crude fiber (less than 10% on a dry matter basis), low in moisture, and highly digestible. Protein concentrates are of plant or animal origin that contain > 20 percent protein.

Condition class	(Term is no longer used by NRCS.) Syn. Range condition class.
Conservation	The use and management of natural resources according to principles that assure their sustained productivity.
Conservation district	A public organization created under state enabling law as a special-purpose district to develop and carry out a program of soil, water, and related resource conservation, use, and development within its boundaries. Usually a subdivision of state government with a local governing body and always with limited authorities. Generally called a soil and water conservation district.
Conservation plan	The recorded decisions of a landowner or operator, cooperating with a conservation district, on how the landowner or operator plans, within practical limits, to use his/her land according to its capability and to treat it according to its needs for maintenance or improvement of the soil, water, animal, plant, and air resources.
Consolidated band	A band of sheep made up of several small bands.
Constancy	The percentage occurrence of a species within a given community type.
Consumers	Heterotrophic organisms, chiefly animals, that ingest other organisms or particulate organic matter.
Consumption	Dietary intake based on amounts of specific forages and other feedstuffs or amounts of specific nutrients.
Contact herbicide	A herbicide that kills primarily by contact with plant tissue rather than as a result of translocation.
Continuous grazing	The grazing of a specific unit by livestock throughout a year or for that part of the year during which grazing is feasible. The term is not necessarily synonymous with yearlong grazing since seasonal grazing may be involved. Also referred to as continuous stocking.
Continuous set stocking	Allowing a fixed number of animals unrestricted access to an area of grazing land for the whole or substantial part of a grazing season.
Contour furrow	A plowed or listed strip, commonly 8 to 18 inches deep and wide, made parallel to the horizontal contour for the purpose of water retention and reduction of soil erosion.
Control	(1) Manipulation and management for reduction of noxious plants, a term of many degrees ranging from slightly limiting to nearly complete replacement. (2) Untreated areas or animals used for research, comparison, or evaluation of treatment responses.

Controlled breeding	(1) Controlling the time of breeding of livestock to synchronize the period of optimum growth for the animals with the period of peak quality and optimum growth of forage. (2) A planned program whereby livestock males and females are brought together for breeding purposes so that offsprings are born during a desired period.
Controlled burning	Syn. Prescribed burning.
Conversion factor	A factor by which stocking rates are partitioned according to the kind or class of animal based on energy requirements. See Animal-unit.
Cool-season plant	A plant that generally makes the major portion of its growth late in fall, in winter, and in early spring. Cool-season species generally exhibit the C-3 photosynthetic pathway.
Coordinated resource management planning	The process whereby various interest groups are involved in discussion of resource uses and collectively diagnose management problems, establish goals and objectives, and evaluate multiple use resource management.
Corral	An enclosure or pen for handling livestock.
Coulee	A regional term used for deep gulch or ravine.
Cover	Syn. Foliar cover, see Basal area.
Cover type	The existing vegetation of an area.
Creep feeding	Supplemental feeding of suckling livestock in such a manner that the feed is not available to the mothers or other mature livestock.
Creep grazing	The practice of allowing juvenile animals to graze areas that their dams cannot access at the same time.
Critical area	An area to be treated with special consideration because of inherent site factors, size, location, condition, values, or significant potential conflicts among uses.
Cropland	Land used primarily for the production of cultivated crops.
Crop residue	The portion of a crop remaining after harvest of seed or other primary plant parts. It may be managed for grazing and/or ground cover and to replenish soil organic matter levels.
Crop rotation pasture	Cropland pasture where livestock are stocked on forages grown in a designed crop rotation cycle with other cultivated crops. Livestock move from crop field to crop field as the stand life of the forage and crop rotation dictate. Depending on the forage stand life and length of the crop rotation, livestock entry may occur seasonally on the same field, or take several years to cycle around the crop fields being grazed in rotation.

Crude fiber	Fiber made up primarily of plant structural carbohydrates, such as cellulose and hemicellulose, but it also contains some lignin.
Crude protein	A calculated portion from the nitrogen content of a feedstuff, using the Kjeldahl procedure. The crude protein content is made up of those compounds defined as proteins and designated true proteins, as well as nonprotein nitrogen compounds such as free amino acids, amides of amino acids, ammonium salts or urea. The protein content of feedstuffs is currently estimated only on the basis of crude protein.
Cryptogam	A plant in any of the groups Thallophytes, Byophytes, Pteridiophytes - mosses, lichens, and ferns.
Culm	The stem of a grass that has elongated internodes between nodes (jointed).
Culmless	A vegetative tiller of some grasses that holds its growing point close to the ground by not elongating internodes until it is ready to initiate reproductive growth.
Cultivar (derived from cultivated variety)	A named variety selected within a plant species. Distinguished by any morphological, physiological, cytological, or chemical characteristics. A variety of plant produced and maintained by cultivation which is genetically retained through subsequent generations.
Cultivars	(1) A variety, strain, or race of plant that has originated and persisted under cultivation or was specifically developed for use as a cultivated crop. (2) For cultivated crops, the equivalent of botanical variety, in accordance with the International Code of Nomenclature of Cultivated Plants—1980.
Cultivated crops	(1) Crops grown from seed, bulbs, corms, sprigs, crowns, tubers, cuttings, and graftings and cared for by humans for harvest or landscaping. (2) Crops genetically improved or developed by various agronomic or horticultural techniques.
Cultivating tools	Variously designed machinery used to uproot weeds to keep them from competing with the desired crop. The class of equipment includes field and row crop cultivators, spike and spring tooth harrows, chain drags, and rotary hoes.
Cured forage	Forage, either standing or harvested, that has been naturally or artificially dried and preserved for future use.
Cut	(1) (v) To separate one or more animals from the herd or band. (n) The animal(s) so separated. (2) To reduce livestock grazing, particularly on a public land allotment.
Dam (GLA)	The female parent of a calf.
Damping off	The rapid rotting of seeds or seedlings before they emerge from the soil or the rapid rotting of the stem bases and toppling of seedlings after emergence.

DBH	Abbreviation of diameter-at-breast-height of a tree.
Death loss	The number of animals in a herd that die from various natural and accidental causes. Usually expressed as a percentage.
Debris	Accumulated plant and animal remains.
Deciduous (plant)	A plant whose parts, particularly leaves, are shed at regular intervals or at a given stage of development.
Decomposer	Heterotrophic organisms, chiefly the micro-organisms, that break down the bodies of animals or parts of dead plants and absorb some of the decomposition products, releasing similar compounds usable by producers.
Decreaser	Plant species of the climax vegetation that will decrease in relative amount with continued heavy defoliation (grazing).
Deferment	Delay of livestock grazing in an area for an adequate period to provide for plant reproduction, establishment of new plants, or restoration of vigor of existing plants. See Deferred grazing and Rest.
Deferred grazing	Postponing grazing or resting an area for a prescribed period, usually to meet a specific management objective.
Deferred-rotation	Any grazing system, that provides for a systematic rotation of the deferment among pastures. The time of the rest period generally changes in succeeding years.
Defoliation	The removal of plant leaves; i.e., by grazing or browsing, chemical defoliant, or natural phenomena, such as hail, fire, or frost.
Degenerated range	Syn. Deteriorated range.
Degree of use	The proportion of current year's forage production that is consumed and/or destroyed by grazing animals. May refer either to a single species or to the vegetation as a whole. Syn. Use.
Density	(1) The number of individuals per unit area. (2) Refers to the relative closeness of individuals to one another.
Desert	An arid area with insufficient available water for dense plant growth.
Desertification	The process by which an area or region becomes more arid through loss of soil and vegetative cover. The process is often accelerated by excessive, continuous overstocking and drought.
Desirable plant (GLA)	See Plant preference classification.

Desired plant community	One of the several plant community types that may occupy an ecological site, the one or combination that meets the minimum quality criteria for the soil, water, air, plant, and animal resources, and that meets the landowner's or manager's objective.
Deteriorated range	Range on which present vegetation and soil conditions represent a significant departure from natural potential. Syn. Degenerated range.
Detritus	Fragmented particulate organic matter derived from the decomposition of debris.
Dietary essentials (nutrient)	Nutrients that must be orally ingested, in contrast to those which can be manufactured or converted in the animal, such as through microbial symbiosis in the rumen.
Digestible dry matter (DDM)	See Digestible organic matter.
Digestible energy (DE)	The gross energy of food consumed minus fecal energy. Energy in the feces accounts for the greatest loss of ingested energy. In ruminants the losses are 40 to 50 percent for roughage and 20 to 30 percent for concentrates. In horses fecal losses account for 40 percent of the energy ingested.
Digestible organic matter (DOM)	A percentage of energy and protein in forages expressed as organic matter intake minus fecal dry matter divided by dry matter intake times 100.
Discounting	The process of determining the present value of a stream of future financial returns.
Discount rate (GLA)	The rate of return that could be earned if you chose an investment other than the one being analyzed; it is the minimum acceptable rate of return from an investment.
Diurnal	Active during daylight hours.
Diversity	A measure of the number of species and their relative abundance in a community.
Docking	v. To surgically shorten an animal's tail.
Doggie	Syn. Orphan.
Domestication status (GLA)	The animal ranking status used in GLA (i.e., domesticated - controllable, wild/feral - uncontrollable, or domestic wild - wild animals that are being managed in a semi-controllable situation, such as game farms).
Dominant	(1) Plant species or species groups that, by means of their number, coverage, or size, have considerable influence or control upon the conditions of existence of associated species. (2) Those individual animals that, by their aggressive behavior or otherwise, determine the behavior of one or more animals resulting in the establishment of a social hierarchy.

Dormant	(1) A living plant that is not actively growing aerial shoots. (2) A pesticide application made on crop plants that are not actively growing.
Drag	An implement used for control of vegetation, e.g., chain drag.
Drainage class	A method of classifying the natural drainage condition of the soil that refers to the frequency and duration of soil wetness.
Draw	A natural watercourse, including the channel and adjacent areas on either side, which may occasionally overflow or receive extra run-in water from higher adjacent areas; generally having intermittent flows associated with higher intensity rainfall.
Drenching	(v) Giving orally a forced dose of a specific solution to an animal, usually to control internal parasites.
Drift	(v) (1) The movement of materials by wind or water. (2) The natural movement of animals. (n) Vegetative material moved and deposited by wind and water. See Spray drift.
Drift fence	An open-ended fence used to retard or alter the natural movement of livestock; generally used in connection with natural barriers.
Drill seeding	Planting seed directly into the soil with a drill in rows, usually 6 to 24 inches apart.
Dripline	The area under the outermost branches of a tree or shrub.
Drip torch	Portable equipment for applying flammable liquids to ignite a vegetative area to be burned. Primarily used in prescribed burning.
Drive	The moving of livestock under human direction. In cowboy parlance, the term drift is often used in lieu of drive when animals are slowly urged in a certain direction.
Drop band	A band of ewes that are giving birth or are expected to give birth within a few days.
Drouth (drought)	(1) A prolonged chronic shortage of water. (2) A period with below normal precipitation during which the soil water content is reduced to such an extent that plants suffer from lack of water; frequently associated with excessively high temperatures and winds during spring, summer, and fall in many parts of the world.
Drouth (drought) plan	The livestock operator's contingency plan to make necessary adjustments during unfavorable years of low forage production.
Dry band	A band of ewes without lambs.

Dry flowable	A water dispersible granule pesticide formulation rather than being suspended in a liquid carrier. See Flowable. Mixed with water and sprayed. Less inhalation hazard to the user.
Dry matter	The amount of a feedstuff remaining after all the free moisture is evaporated out. The feedstuff is placed in a oven at a temperature of 100 to 105 °C.
Dry matter digestibility (DMD)	The percentage of energy and protein in forages expressed as dry matter intake minus fecal dry matter divided by dry matter intake times 100.
Dry meadow	A meadow dominated by grasses which is characterized by soils that become moderately dry by midsummer.
Dual use	Grazing the current year's forage production by two species of grazing animals at the same time. See Co-grazing.
Dugout	An artificially constructed depression that collects and stores water and differs from a reservoir in that a dam is not relied upon to impound water. See Stock pond.
Dust	(1) Windblown soil. (2) A formulation that is a finely ground, dry mixture of an inert carrier and a pesticide. Danger of drift and inhalation by user during use.
Early head	Flower head (seedhead) of a grass is emerging or emerged from flag leaf sheath, but not shedding pollen.
Earmarking	The process of removing parts of the ears of livestock to leave a distinctive pattern for the purpose of designating ownership and identification.
Ecesis	Establishment and development of a plant in the plant community.
Ecological site	A distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation.
Ecology	The study of the interrelationships of organisms with their environment.
Ecosystem	Organisms together with their abiotic environment, forming an interacting system, inhabiting an identifiable space.
Ecotone	A transition area of vegetation between two communities, having characteristics of both kinds of neighboring vegetation, as well as characteristics of its own. Varies in width depending on site and climatic factors.
Ecotype	A locally adapted population within a species that has certain genetically determined characteristics; interbreeding between ecotypes is not restricted. See Biotype.
Edaphic	Refers to the soil.

Edge effect	(1) The influence of one adjoining plant community upon the margin of another affecting the composition and density of the populations. (2) The effect executed by adjoining communities on the population structure within the margin zone.
Effective precipitation	That portion of total precipitation that becomes available for plant growth. It does not include precipitation lost to deep percolation below the root zone, to surface runoff, to evaporation, or to rainfall that falls during the dormant season and is gone from the soil profile prior to the growing season.
Effluent (silage)	Leachate produced by excess moisture in silage during anaerobic fermentation; often called silage juice or silo juice. If allowed to escape the silo facility, it poses a significant threat to receiving water because of its high biochemical oxygen demand.
Emergency crops	Crops, not part of a planned rotation, grown either because of primary crop failure (planting delayed past time needed for maturity or failed growth after planting) or lack of grazeable forage on fields used for pasture, or both.
Emergency feeding	Supplying feed to range animals when available forage is insufficient because of heavy storms, fires, or other such emergencies. See maintenance feeding and Supplemental feeding.
Emulsifiable concentrate	A pesticide formulation with the active ingredient and an emulsifier suspended in a liquid. It mixes well and easy to handle, but is more easily absorbed through the skin. Can be corrosive and of greater toxicity.
Enclosure	An area fenced to confine animals.
Endemic	Native to or restricted to a particular area, region, or country.
Energy adjustment factor (GLA)	An adjustment factor in GLA for the animal's net energy level.
Energy for maintenance	Energy used to carry out service functions that are performed by the tissues and organisms for the benefit of the organism.
Ensile	(1) To preserve a forage crop as silage. (2) The act of placing a forage crop in a silo.
Enterprise	Any segment of the land unit's business that can be isolated by accounting procedures so revenue and expenses can be allocated to it.
Environment	The sum of all external conditions that affect an organism or community to influence its development or existence.
Epinasty	The bending or twisting of twigs or leaf petiole or blades; often used in diagnosis of herbicidal effects on plants.

Eradication (plant)	Complete kill or removal of a noxious plant from an area, including all plant structures capable of sexual or vegetative reproduction.
Erosion	(v) Detachment and movement of soil or rock fragments by water, wind, ice, or gravity. (n) The land surface worn away by running water, wind, ice, or other geological agents, including such processes as gravitational creep.
Escarpment	A steep slope or ridge, terminating high lands abruptly, which was formed by erosion or by faulting.
Esophageal-cannula	A device used for maintenance and closure of an esophageal fistula.
Esophageal-fistula	A permanent, surgically established opening in the esophagus of an animal used for collecting diet samples. See Esophageal-cannula.
Essential element	A chemical element that is essential to the life of an organism.
Evapotranspiration	The actual total loss of water by evaporation from soil, waterbodies, and transpiration from vegetation over a given area with time.
Evergreen (plant)	A plant that has leaves all year round and sheds them more or less regularly through all seasons.
Exchangeable aluminum (extractable)	The amount of aluminum extracted in one normal potassium chloride that was on the cation exchange sites in the soil.
Enclosure	An area fenced to exclude animals.
Exotic	An organism or species that is not native to the region in which it is found.
Exposure	Direction of slope with respect to points of a compass.
Facilitating practices	Practices that control or influence the movement and handling of grazing animals and make it easier to apply vegetative management practices. Facilitating practices include practices, such as water developments, stock trails, walkways, fencing, salting, and herding.
Fauna	The animal life of a region. A listing of animal species of a region.
Fecal analysis	A process of analyzing livestock manure for diet content of crude protein and digestible organic matter.
Feed	(n) Any non-injurious, edible material having nutritive value when ingested. (v) The act of providing feed to animals.
Feed additive (GLA)	A feed ingredient provided to animals that improves the conversion efficiency of ruminants.
Feed additives	Materials other than the feeds themselves added to diets; e.g., vitamins, mineral supplements, or antibiotics.

Feed conversion (feed efficiency) (GLA)	Units of feed consumed per unit of body weight gained; the production (meat, milk) per unit of feed consumed.
Feed ground	A designated place on a range where livestock are fed.
Feed reserve	Feed stored for future use. See Forage reserve.
Feedstuff profiles (GLA)	A list of common feedstuffs and their nutritional value to cattle, sheep, goats, and horses.
Feedstuffs	Any substance suitable for animal feed.
Fence	A structure that acts as a barrier to livestock, wildlife, or people.
Fencing	Enclosing or dividing an area of land with a suitable structure that acts as a barrier to livestock, wildlife, or people.
Feral	Escaped from cultivation or domestication and existing in the wild.
Fescue foot	A malady in cattle that commonly occurs during late fall and winter grazing of endophyte infected tall fescue. Symptoms range from hind quarter tenderness (slow walk with limp) to gangrene and tissue death of tail, ear, and feet. In extreme cases a tail or hoof may be lost. Constriction of blood vessels at the extremities limits blood flow to them and causes tissue death.
Fescue toxicosis	A malady in cattle that commonly occurs during summer grazing of endophyte infected tall fescue. Symptoms include rough hair coat, low weight gain or milk production, rapid breathing, excess salivation, increased body temperature, depressed serum-prolactin levels, poor conception rates, and general unthrifty condition. Cattle spend an inordinate amount of time in shade or water, or wallow in the mud if accessible. This malady is directly linked to ergopeptine alkaloids.
Fibrous root system	A plant root system having a large number of small, finely divided, widely spreading roots, but no large taproots. Typified by grass root system.
Firebrand	A piece of burning wood or other material. A term used in prescribed burning describing a piece of burning material drifting away from the primary fire and capable of starting another fire.
Firebreak	A natural or manufactured barrier used to prevent or retard the spread of fire, that is in existence or made before a fire occurs. It is usually created by the removal of vegetation. See Fireline and Fuelbreak.
Fireline	A narrow line, 2 to 10 feet wide, from which all vegetation is removed by soil sterilization, yearly maintenance, treatment with chemical fire retardant, or clearing just before ignition of a prescribed burn.
First-last grazing	A method of using two or more groups of animals, usually with different nutritional requirements, to graze sequentially on the same area.

Fixation	A soil process that renders available plant nutrients unavailable or fixed in the soil.
Flail conditioner	A machine used to abrade the waxy outer plant layer and break plant stems that have been cut for harvest. It uses steel or nylon free-swinging fingers on a revolving shaft (rotor). It was developed for use on grass hay crops only.
Flexibility	Characteristics of a management plan that allow it to accommodate changing conditions.
Flock	A group of sheep managed in fenced pastures. See Band.
Flooding	The temporary covering of the soil surface by water that flows over it from any source, such as a stream, irrigation canal, tidal action, or runoff from adjacent or surrounding slopes.
Flora	(1) The plant species of an area. (2) A simple list of plant species or a taxonomic manual.
Flowable	A pesticide formulation that is a finely ground material suspended in a liquid carrier. It is easy to handle and apply.
Flushing	Improving the nutrition of female breeding animals prior to and during the breeding season to stimulate ovulation.
Fluvial	Pertaining to or produced by the action of a stream or river.
Foliage	The green or live leaves of plants; mass leaves or leafage.
Foliar cover	The percentage of ground covered by the vertical projection of the aerial portion of plants. Small openings in the canopy and intraspecific overlap are excluded. Foliar cover is always less than canopy cover; either may exceed 100 percent. Syn. cover.
Food reserves	The excess carbohydrates in plants produced during photosynthesis and stored in a readily available form in various plant parts. Depending on forage species, they may be stored in the root, stem base, stolon, or rhizome. Often erroneously called root reserves.
Forage	(n) All browse and herbage that is available and acceptable to grazing animals, or that may be harvested for feeding purposes. (v) Act of consuming forage. Syn. graze.
Forage allocation	The planning process or act of apportioning available forage among various kinds of animals; e.g., elk and cattle.
Forage allowance	Weight of forage per unit of animal demand at any instant of time. It is the inverse of grazing pressure and synonymous with herbage allowance.

Forage crops	(Specific) Forage plants mechanically harvested before being fed to animals. These crops are fed to animals primarily as hay, haylage, fodder (stover), silage, or green chop. (General) A crop of cultivated plants, whose plant parts, other than separated grain, are produced to be grazed or harvested for use as feed for animals.
Forage harvest management	The timely cutting and removal of forages from the field as hay, green-chop, or ensilage.
Forage harvester	A machine that cuts standing forage or picks up windrowed forage and chops it to the desired length of cut for silage and blows the chopped forage into a trailing forage wagon or truck box.
Forage (herbage) on-offer	(1) Total forage presented to livestock on a pasture at any moment in time. It is equal to available forage times pasture acreage. (2) A term that is synonymous with forage allowance. See Forage allowance.
Forage inventory	An estimate of available forage in each pasture and for the operating unit as a whole; used to project stocking rates and feed requirements for specific time periods (i.e., annually, grazing season, rotation cycle)
Forage moisture content (GLA)	The percent of plant weight that is water.
Forage production	The weight of forage that is produced within a designated period in a given area. The weight may be expressed as either green, air-dry, or oven-dry. The term may also be modified as to time of production, such as annual, current year's, or seasonal forage production.
Forage reserve	Standing forage specifically maintained for future or emergency use.
Forage suitability groups	Soils with similar species adaptation, production potential, and management needs. A planning tool for species selection, practice selection, management options, forage production levels, and recommended initial stocking rates.
Forage utilization	The percentage of available forage actually consumed by the grazing animal based on net forage accumulation that occurs prior to and while they occupy the pasture unit.
Forage value (GLA)	The classification scheme for determining stocking rates in grazeable forest land based on the minimum percent of preferred species and minimum percent of preferred and desirable species in a stand. Values are very high, high, moderate, and low.
Forage value rating	A utilitarian rating of forage plants on a particular area for a specific kind of herbivore. Forage ratings are based on preference, quality, nutritional value, and plant maturity. This is not an ecological rating.
Forb	Any broad-leaved herbaceous plant other than those in the Gramineae (or Poaceae), Cyperaceae, and Juncaceae families.

Ford	A constructed or natural stream crossing for equipment, humans, or animals at a point where water is shallow, footing is firm, and banks are low or inclined for easy approach and exit. The bottom of the channel and approaches are either naturally or artificially paved to facilitate ease of crossing and to reduce muddying of the water.
Forest land (forest)	Land on which the historic climax plant community is dominated by trees.
Formulation	(1) A pesticide product supplied by the manufacturer for practical use composed of the active ingredient and a carrier. (2) The process of preparing pesticides for practical use carried out by manufacturers.
Frame score	A score based on a subjective evaluation of height or actual measurement of hip height, related to slaughter weights at which cattle will grade choice or have comparable amounts of fat cover over the loin eye at the 12th to 13th rib. For horses, frame score is the measure of the size by height at the withers (shoulders).
Free range	Range open to grazing regardless of ownership and without payment of fees. Not to be confused with open range.
Free ranging	Ability to roam or forage at-will, unrestricted by fences.
Frequency (relative)	The ratio between the number of sample units that contain a species and the total number of sample units.
Fresh mulch	The primary layer of bulky, coarse, largely undecayed herbage residuum. See Mulch.
Fresh weight	The weight of plant materials at the time of harvest. Syn., green weight.
Frontal grazing	A stocking method by which ungrazed forage within a management unit is allocated by moving a portable fence ahead of a herd of livestock.
Frost action potential	The rating of the susceptibility of a soil to frost heave upward or laterally by the formation of segregated ice lens wedges between soil peds.
Frost heave	Soil and plants displaced by ice needles and lenses. Primary frost heave is caused by ice needles producing minor soil displacement. Secondary frost heave is caused by ice lenses producing major soil displacement. Primary frost heave tends to displace seedlings. Secondary frost heave can displace mature overwintering plants. The heaving action pushes plants upward. This causes root breakage, desiccation of exposed roots, and often death of susceptible plant species.
Fuelbreak	A strategically located block or strip on which existing flammable vegetation has been replaced by vegetation of lower fuel volume and/or flammability and subsequently maintained as an aid to fire control. See Fireline.
Fumigant	A volatile chemical that kills pests with a gas or vapor.

Fungicide	Any chemical agent that kills or inhibits fungi that cause plant diseases.	
Game	(1) Wild birds, fish, and other animals hunted. (2) Wildlife species so designated by law and the harvest of which is regulated by law.	
Game ranching (game farming)	Maintaining game animals under semidomestication and maximum animal management to control breeding, health, nutrition, and production as a ranch based enterprise.	
Game range	Range that is predominantly grazed by wildlife seasonally or year around. Especially pertinent with migratory big game herds; e.g., winter elk or deer range.	
Game refuge	An area set aside as a sanctuary for game.	
Geographic Information System (GIS)	A spatial type of information management system that provides for the entry, storage, manipulation, retrieval, and display of spatially oriented data.	
Global Positioning System (GPS)	A computer based receiver system that uses satellite transmissions to determine precise latitude and longitude readings at any location in a field. This system is used to map crop yield, soil fertility, weed infestations, soil type, and other yield influencing differences. It then forms the basis for variable rate applications of fertilizer and pesticides. Application equipment is guided by a georeferenced program to deliver different application rates as it traverses back and forth across a field.	
Grade	(1) In livestock breeding, an offspring resulting from mating a purebred with a non-purebred or from mating animals not purebred, but having close purebred ancestors. (2) Livestock marketing classification. (3) To evaluate live animals in relation to a standard of quality.	
Graminoid	Grass or grass-like plant, such as <i>Poa</i> , <i>Carex</i> , and <i>Juncus</i> species.	
Grams per plot to kilograms per hectare	Plot size	Multiply grams by:
	0.25 M ²	40
	1.0 M ²	10
	10.0 M ²	1
	100 M ²	0.10
	400 M ²	0.025
Grams per plot to pounds per acre	Plot size	Multiply grams by:
	1.92 ft ²	50
	2.4 ft ²	40
	4.8 ft ²	20
	9.6 ft ²	10
	96 ft ²	1

Granule	(1) A soil aggregate. (2) A pesticide formulation of dry, ready-to-use, low-concentrate pesticide with a particle size less than 10 cubic millimeters. Drift hazard is low. Contamination hazard to the user is low. Soil applied. May be ingested by birds.
Grass	A member of the family Gramineae (Poaceae).
Grassland	Land on which the vegetation is dominated by grasses, grasslike plants, and/or forbs.
Grassland agriculture	A land management system emphasizing cultivated forage crops, pasture, and rangelands for livestock production and natural resource protection.
Grasslike plant	A plant of the Cyperaceae or Juncaceae families that vegetatively resembles a true grass of the Gramineae family.
Graze	(1) (vi) The consumption of standing forage by livestock or wildlife. (2) (vt) To put livestock to feed on standing forage.
Grazeable forest land	Land capable of sustaining livestock grazing by producing forage of sufficient quantity during one or more stages of secondary forest succession.
Grazed forest land	Land that is currently used for forest land and livestock grazing.
Grazed rangeland	Rangeland that is used primarily for the production of livestock. Grazed rangelands include native plant communities and those seeded to native or introduced species, or naturalized by introduced species, that are ecologically managed using range management principles.
Grazer	A grazing animal.
Grazier	A person who manages grazing animals.
Grazing	(vt) To graze.
Grazing behavior	The foraging response elicited from a herbivore by its interaction with its surrounding environment.
Grazing capacity	The total number of animals that may be sustained in a given area based on total forage resources available, including harvested roughages and concentrates. See Carrying capacity.
Grazing distribution	Dispersion of livestock grazing within a management unit or area.
Grazing district	(1) An administrative unit of federally managed, public rangeland established by the Secretary of Interior under the provisions of the Taylor Grazing Act of 1934, as amended. (2) An administrative unit of state, private, or other rangelands established under certain state laws.
Grazing fee	A charge, usually on a monthly basis, for grazing a given kind of animal.

Grazing land	(1) Collective term used by NRCS for rangeland, pastureland, grazed forest land, native and naturalized pasture, hayland, and grazed cropland. Although grazing is generally a predominate use, the term is used independent of any use. (2) Land used primarily for production of forage plants maintained or manipulated primarily through grazing management. Includes all lands having plants harvestable by grazing without reference to land tenure, other land uses, management, or treatment practices.
Grazing land mechanical treatment	Renovating, contour furrowing, pitting, or chiseling native grazing land by mechanical means. The purpose of this practice is to improve plant cover and water quality by aerating the soil, increasing infiltration and available moisture, reducing erosion, and protecting low areas or structures from siltation.
Grazing license	Official written permission to graze a specific number, kind, and class of livestock for a specified period on a defined allotment or management area.
Grazing management	The manipulation of grazing and browsing animals to accomplish a desired result.
Grazing management plan	A program of action designed to secure the best practicable use of the forage resources by manipulation of the grazing animal.
Grazing period	The length of time that animals are allowed to graze on a specific area.
Grazing permit	Syn. grazing license.
Grazing preference	(1) Selection of certain plants, or plant parts, over others by grazing animals. (2) In the administration of public lands, a basis upon which permits and licenses are issued for grazing use.
Grazing pressure	(1) Animal-demand per unit weight of forage at any instant; i.e., AU/T; an animal/forage relationship. (2) The relationship between the amount of forage utilized by grazing animals on a given area.
Grazing privilege	Permissive use of lands for grazing by livestock.
Grazing right	A right to graze specified lands, permanently vested in the beneficiary as specified by the terms of the law or contract.
Grazing season	(1) The time interval when animals are allowed to use a certain area. (2) On public lands, an established period for which grazing permits are issued. May be established on private land in a grazing management plan
Grazing survey	The systematic collection of data pertaining to forage resources and other information pertinent to range management. May be either extensive or intensive grazing survey. See Forage inventory.

Grazing system	<p>A specialization of grazing management that defines systematically recurring periods of grazing and deferment for two or more pastures or management units. Descriptive common names, such as Merrill, Hormay, or South African switchback, may be used. However, the first usage of a grazing system name in a publication should be followed by a description using a standard format. This format shall consist of a numerical description in the following prescribed order: the number of pastures (or units), number of herds, length of grazing periods, length of deferment periods for any given unit in the system followed by an abbreviation of the unit of time used. Examples:</p> <ul style="list-style-type: none"> • Merrill system (4-3;12: 4 mo.) is a grazing system with 4 pastures, 3 herds of livestock, a 12-month grazing period, and a 4-month deferment period. • South African switchback (2-1;3:3,6:3,3:6 mo.) is a grazing system with 2 pastures, 1 herd, and a grazing schedule of 3 months grazing, 3 months deferment, 6 months grazing, 3 months deferment, 3 months grazing, 6 months deferment. • High intensity, low frequency (HILF) (14-1; 12:156 da.) A grazing system consisting of 14 pastures, 1 herd, a 12-day grazing period, and a 156-day deferment period for each pasture.
Grazing trespass	The grazing of livestock on range without proper authority and resulting from a willful or negligent act.
Grazing unit	An area of land which is grazed as an entity.
Green chop	Mechanically harvested forage fed to animals while still fresh.
Green manure	Any crop or plant grown and not harvested that is used to improve the soil's organic matter content and structure. It may or may not be incorporated by tillage.
Ground cover	The percentage of material, other than bare ground, covering the land surface. It may include live and standing dead vegetation, litter, cobble, gravel, stones, and bedrock. Ground cover plus bare ground would total 100 percent. Syn. cover, see Foliar cover.
Ground datum	A point on the earth's surface used as reference for measuring the height of aerial photography and for calculating photo scale.
Ground truth	Measurements or observations made on the ground for the purpose of verifying interpretations made from aerial photography or remote sensing.
Ground water	Subsurface water that is in the zone of saturation. The top surface of the ground water is the water table. Source of water for wells, seepage, and springs.
Growing season	That portion of the year when temperature and moisture permit plant growth.
Growth form	The characteristic shape or appearance of a plant.

Growth regulator	An organic substance effective in minute amounts for controlling or modifying plant processes.						
Grubbing	The act of removing roots, whether woody or herbaceous, by humans or animal activity.						
Gully	A furrow, channel, or miniature valley, usually with steep sides, through which water commonly flows during and immediately after rains or snow-melt.						
Guzzler	A device for collecting and storing precipitation for use by wildlife or livestock. Consists of an impenetrable water collecting area, a storage facility, and a trough from which animals can drink. Syn. Catchment basin.						
Habitat	The natural abode of a plant or animal, including all biotic, climatic, and edaphic factors affecting life.						
Habitat type	The collective area which one plant association occupies. The habitat type is defined and described on the basis of the vegetation and its associated environment.						
Half-shrub	A perennial plant with a woody base whose annually produced stems die each year.						
Hardiness	The ability to survive exposure to adverse conditions.						
Hardpan	A hardened soil layer in the lower part of the horizon A or in the B horizon caused by cementation of soil particles with organic matter or with such materials as silica, sesquioxides, or calcium carbonate. The hardness does not change appreciably with changes in moisture content, and pieces of the hard layer do not crumble in water.						
Harvest	Removal of animal or vegetation products from an area of land.						
Harvest efficiency	<p>The total percent of vegetation harvested by a machine or ingested by a grazing animal compared to the total amount of vegetation grown in the area in a given year. For continuous grazing, harvest efficiency usually averages:</p> <table> <tr> <td>Rangeland</td><td>25 percent</td></tr> <tr> <td>Pastureland</td><td>30 percent</td></tr> <tr> <td>Grazed cropland</td><td>35 percent</td></tr> </table>	Rangeland	25 percent	Pastureland	30 percent	Grazed cropland	35 percent
Rangeland	25 percent						
Pastureland	30 percent						
Grazed cropland	35 percent						
Harvest interval	The length of time that occurs between forage cuttings.						
Hay	The herbage of grasses, legumes, or comparatively fine-stemmed forbs cut and cured (dried) to preserve forage for later use as livestock feed.						
Hay crop	Forage crops traditionally harvested for dry hay that can also be ensiled.						
Haylage	A fermented product resulting from ensiling forage that ranges from 40 to 55 percent moisture in the absence of oxygen.						

Headfiring	Ignition of a fire on the windward (upwind) side of a burn area resulting in a fairly rapid moving flame front moving with the wind.
Hedged	The appearance of woody plants that have been repeatedly browsed so as to appear artificially clipped.
Hedging	The persistent browsing of terminal buds of browse species causing excessive lateral branching and a reduction in main stem growth.
Heifer (GLA)	A female of the cattle species less than 3 years of age that has not borne a calf.
Herb	Any flowering plant except those developing persistent woody stems above ground.
Herbaceous	Vegetative growth with little or no woody component. Nonwoody vegetation, such as graminoids and forbs.
Herbage	(1) Total aboveground biomass of plants including shrubs regardless of grazing preference or availability. (2) Herbs taken collectively.
Herbage allowance	Weight of forage available per unit animal demand at any instant.
Herbage disappearance rate	The rate per unit area at which herbage leaves the standing crop by grazing, senescence, or other causes.
Herbage growth rate	The rate of addition of new mass per unit area to the standing crop.
Herbage production	Production of certain herbaceous plants or groups of herbaceous plants.
Herbicide	A chemical used to kill or inhibit the growth of plants.
Herbivore	An animal that subsists principally or entirely on plants or plant materials.
Herd	An assemblage of animals usually of the same species.
Herder	One who tends livestock on a range. Usually applied to the man herding a band of sheep or goats.
Herding	The handling or tending of a herd.
Hide factor (GLA)	Indicates the thickness of the animal's hide. This factor is used in GLA to compute the insulating value of the animal's hide relative to energy requirements for the thermal environment of the animal (e.g., Holstein-thin, Hereford-thick, Angus-moderate).
High intensity, low frequency	Usually a single herd multipasture grazing system, that normally includes a slow rotation for range improvement (usually characterized by relatively long grazing periods and substantially longer rest periods).

Highlining	Syn. browse line.
Historic climax plant community	The plant community that was best adapted to the unique combination of factors associated with the ecological site. It was in a natural dynamic equilibrium with the historic biotic, abiotic, climatic factors on its ecological site in North America at the time of European immigration and settlement.
Holding ground	An area where livestock are often held during roundups.
Home range	The area over which an animal normally travels in search of food.
Humus	The organic fraction of soil in which decomposition is so far advanced that its original form is not distinguishable.
Hybrid	Offspring of a cross between genetically dissimilar individuals.
Hybrid vigor	The increased performance (rate of gain) associated with F1 crossbreeding.
Hydrocyanic acid	A poisonous compound, HCN, produced when forages containing anti-quality chemicals called cyanogenic glycosides and the proper enzymes are eaten by a grazing animal. Plants developed cyanogenic compounds as a defense mechanism against herbivore feeding. It is the scientific term for prussic acid.
Ice-cream species	A slang term used to indicate obvious grazing preference by livestock and game animals. Such species are the first plants grazed by livestock and are often overutilized under excessive grazing.
Improved pasture	Grazing land permanently producing introduced or domesticated native forage species that receives varying degrees of periodic cultural treatment to enhance forage quality and yields and is primarily harvested by grazing animals.
Increaser	The climax native plants in a community of different plants that, under excessive continuous grazing by livestock, are not selected initially, and increase in abundance. If the heavy grazing continues, livestock will reduce the more palatable plants and shift to the increaser species causing them to decrease in abundance.
Indicator species	(1) Species that indicate the presence of certain environmental conditions, range condition, previous treatment, or soil type. (2) One or more plant species selected to indicate a certain level of grazing use. See Key species.
Indigenous	Born, growing, or produced naturally (native) in an area, region, or country.
Infestation	Invasion by large numbers of parasites or pests.

Infiltration	The intake of water into the soil profile. It connotes flow into a substance in contradistinction to the word percolation.
Infiltration rate	Maximum rate at which soil under specified conditions can absorb rain or shallow impounded water, expressed in quantity of water absorbed by the soil per unit of time; e.g., inches per hour.
Infiltration velocity	The actual rate at which water is entering the soil at any given time. It may be less than infiltration rate because of limited supply of water. Expressed in same units as infiltration rate.
Ingest	Nutritive materials consumed by the animal.
Initial stocking rate	A safe starting stocking rate assumed to ensure against excessive grazing utilization. It is intended as a guide until experienced yields can be determined and realistic stocking rates established for a given area.
Insecticide	A pesticide used to control or prevent damage by insects.
Intake adjustment (GLA)	A percent of feed consumed either above or below the average Animal Unit Equivalent intake by specific breed types of cattle. Used to calculate feed and nutritional demands in GLA.
Integrated pest management	Controlling pest populations using a combination of proven methods that achieve the proper level of control of them while minimizing harm to other organisms in the ecosystem. Control methods include natural suppression, biological control, resistance breeding, cultural control, and direct control.
Internal rate of return (GLA)	An estimate of the average annual rate of return that an investment will produce over a given period. It is the discount rate that results in a Net Present Value of zero.
International feed number (INF) (GLA)	A number that applies to a feedstuff and animal kind. This number is used for identification and computer manipulation. It is particularly useful as a tag to recall nutrient data for calculation of diets. Numbers are assigned to individual feed samples by the National Research Council.
Interseeding	Planting seed in the center of narrow seedbed strips, commonly 6 inches to 6 feet wide and prepared by mechanical or chemical methods.
Introduced species	A species not a part of the original fauna or flora of the area in question.
Invader	Plants that are not a part of the original plant community that invade an area as a result of disturbance, or plant community deterioration, or both.
Invasion	The migration of organisms from one area to another area and their establishment in the latter.
Invert emulsion	A water soluble pesticide dispersed in an oil carrier. Forms large droplets that do not drift easily.

Inverter	A swathing machine that lifts a swath of cut forage and turns it over to speed drying and avoid weather damage to a hay crop.
Jointed	A grass stem that has distinct, elongated internodes between nodes.
Key grazing area	A relatively small portion of a pasture or management unit selected because of its location, use, or grazing value as a monitoring point for grazing use. It is assumed that key areas, if properly selected, will reflect the current grazing management over the pasture or management unit as a whole.
Key species	A single plant species (or in some situations two or three similar species) chosen to serve as a guide to the grazing use of the entire plant community. If the key species on the key grazing area is properly grazed, the entire plant community will not be excessively grazed.
Kid crop	The number of kids produced by a given number of does, usually expressed in percent kids weaned of does bred.
Kid house	A small structure designed to give shelter to a newborn kid. The doe or the kid is staked so that both remain in or near the shelter.
Kind of animal	An animal species or species group, such as sheep, cattle, goats, deer, horses, elk, antelope.
Lamb crop	The number of lambs produced by a given number of ewes, usually expressed in percent of lambs weaned of ewes bred.
Lambing ground	Range reserved for grazing during lambing period.
Land capability	Land capability, as originally used in the United States, is an expression of the effect of physical land conditions, including climate, on the total suitability for use without damage for crops that require regular tillage.
Land use class (GLA)	The classification of land based on the primary use and associated management practices (i.e., rangeland, pastureland, hayland, native pastureland).
LD50	The relative degree of toxicity of pesticides to warmblooded animals. Defined as the single lethal dosage by mouth that kills 50 percent of test animals, expressed as mg/kg of body weight.
Leaf area index (LAI)	Sum of leaf area expressed as a percentage of ground surface. Leaf area index may exceed 100 percent.
Lessee	One who has specified rights or privileges under lease. Syn. permittee.
Lessor	One who leases specified rights or privileges.
License	See Grazing license or Permit.
Life-form	Characteristic form or appearance of a species at maturity, e.g., tree, shrub, herb.

Lime	(1) Calcium oxide. (2) All limestone-derived materials applied to neutralize acid soils.								
Limiting factor	Any environmental factor that exists at suboptimal level and thereby prevents an organism from reaching its full biotic potential.								
Linear extensibility percent	The unit of measurement that determines soil shrink-swell classes. It is the linear expression of the volume difference of natural soil fabric at one-third bar or one-tenth bar water content and oven dryness. It equals the moist length minus the dry length value sum divided by the dry length times 100.								
Litter	The uppermost layer of organic debris on the soil surface; essentially the freshly fallen or slightly decomposed vegetal material.								
Livestock	Domestic animals used for the production of goods and services.								
Livestock exclusion	Land closed to grazing by domestic livestock.								
Livestock flexibility	The ability to alter the number, kind, or class of animals within a livestock enterprise as warranted by variability in forage, economic, weather, or other conditions.								
Livestock management	Application of technical principles and business methods to livestock production.								
Livestock operation	(Farm) See Ranch.								
Livestock production	(1) The weight, number of animals, etc., that a rangeland area, seeded pasture, or management system produces. (2) The business of producing livestock.								
Local plant code (GLA)	A four character code system for identifying the plant common name in GLA <table> <tr> <td>Common Name</td><td>Local</td></tr> <tr> <td>Single name</td><td>SING</td></tr> <tr> <td>Double Name</td><td>DONA</td></tr> <tr> <td>Some Triple Name</td><td>STNA</td></tr> </table>	Common Name	Local	Single name	SING	Double Name	DONA	Some Triple Name	STNA
Common Name	Local								
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Maintenance	Condition in which a nonproductive animal neither gains nor loses body energy reserves.								
Maintenance burning	The use of prescribed burning to maintain vegetation in a desired condition or to maintain the desired composition. Most often used to reduce woody species.								
Maintenance feeding	Supplying feed to range animals when available forage does not meet their minimum daily requirement. This may be necessitated by excessive grazing, inclement weather, or the inability of the site to produce the desired quality forage.								

Maintenance fertilizer applications	Nutrient additions that replace losses by one or more of the following: crop removal, erosion, leaching, denitrification, fixation, and volatilization.
Major Land Resource Area (MLRA)	Broad geographic areas that are characterized by a particular pattern of soils, climate, water resources, vegetation, and land use. Each MLRA in which rangeland and forest land occur is further broken into range sites.
Management area	An area for which a single management plan is developed and applied.
Management plan	A program of action designed to reach a given set of objectives.
Management site potential	The kinds of levels of productivity or values of a range site that can be achieved under various management prescriptions.
Management unit (GLA)	In GLA this is synonymous with pasture or field number.
Management unit	A subdivision of a management area.
Marginal land	Land of questionable physical or economic capabilities for sustaining a specific use.
Marker	(1) A colored or otherwise marked sheep in a range band. (2) Dye, foam, or paper strips to indicate area covered in earlier pass of sprayer. (3) An infertile (vasectomized) male animal, often equipped with a dye marker, used to identify ovulating females for artificial insemination.
Marking	Any method, other than branding, of placing a sign on an animal for the purpose of identification. For example: ear slits, tags, wattles. See Brand, Earmarking, and Tagging.
Marsh	Flat, wet, treeless areas usually covered by standing water and supporting a native growth of grasses and grasslike plants.
Mast	Nuts, acorns, fruit, and similar plant products that may be consumed by animals.
Mature soil	A soil with well developed characteristics produced by the natural processes of soil formation and in equilibrium with its environment. See Soil.
Maximum coat length (GLA)	The maximum length of the animal's hair coat in the coldest period of the year. GLA uses this value to determine body nutritional needs.
Maximum economic yield	The yield reached where the last increment of an input, such as fertilizer, just pays for itself by producing a yield increment of equal value.
Meadow	An area of perennial herbaceous vegetation, usually grass or grasslike, used primarily for hay production.
Mesa	A flat-topped mountain, or other elevation bounded on at least one side by a steep cliff. Local in Southwest.

Metabolizable energy (ME)	The gross energy of feed minus energy in feces, urine, and gaseous products of digestion.		
Metric units	To Convert:	To:	Multiply by:
	Kilograms per hectare	Pounds per acre	0.891
	Kilograms	Pounds	2.2046
	Hectares	Acres	2.471
	Pounds per acre	Kilograms per hectare	1.12
	Pounds	Kilograms	0.4536
	Acres	Hectares	0.4047
Microencapsulate	A formulation where particles of a pesticide, either dry or liquid, are surrounded by a plastic coating. Can be used as a slow release product. Safer to the user since active ingredient is not exposed. Hazard to bees if picked up by a worker and taken back to hive. Can settle to bottom of spray tank unless agitated.		
Migrant	One that moves from place to place.		
Miticide	A pesticide used to control mites and ticks. Also called acaricide.		
Molluscides	Poisons used to kill terrestrial mollusks, such as slugs.		
Morphology	The form and structure of an organism, with special emphasis on external features.		
Mott	A group of trees and/or shrubs.		
Mottling	Variation of coloration in soils as represented by localized spots, patches, or blotches of contrasting color. Commonly develops under alternating wet and dry periods with associated reduction and oxidation environments. Mottling generally indicates poor aeration and impeded drainage.		
Mower-conditioner	A pull-type or self-propelled machine that has a mower unit mounted in front of a conditioner unit for one pass mowing and conditioning of forages being prepared for harvest. Both units are enclosed in the same housing.		
Mulch	(n) (1) A layer of dead plant material on the soil surface. (2) An artificial layer of material, such as paper or plastic, on the soil surface. (v) Cultural practice of placing rock, straw, asphalt, plastic, or other material on the soil's surface as a mulch.		
Multiple use	Use of land for more than one purpose; i.e., grazing of livestock, wildlife production, recreation, watershed, and timber production. Not necessarily the combination of uses that will yield the highest economic return or greatest unit output.		
National plant symbol (GLA)	A unique plant code assigned to each scientific plant name in the National List of Scientific Plant Names.		
Native pasture	See Naturalized pasture.		

Native species	A species which is a part of the original fauna or flora of the area in question. See Indigenous.
Naturalized pasture	Forest land that is used primarily for the production of forage for grazing by livestock rather than for the production of wood products. Overstory trees are removed or managed to promote the native and introduced understory vegetation occurring on the site. This vegetation is managed for its forage value through the use of grazing management principles.
Naturalized species	An introduced species that has become adapted to a new climate, different ecological site, or a different environment and can perpetuate itself in the community without cultural treatment.
Nematicide	A pesticide used to control nematodes.
Nematodes	Tiny, tubular, unsegmented, eel-like, soil-borne worms that feed on plant roots or parasitize grazing animals.
Net energy (NE)	Energy available to the animal for the maintenance or various productive purposes.
Net present value (GLA)	Today's worth of a sum of money that is to be available sometime in the future.
Net primary production	The net increase in plant biomass within a specified area and time interval; i.e., primary production less that used in metabolic processes.
Niche	The ecological role of a species in a community.
Nonconsumed plant (GLA)	See Plant preference classification.
Nonprotein nitrogen	Sources other than natural protein, such as urea, biuret, and ammonia hydroxide.
Nonjointed	See Culmless.
Nonuse	(1) Absence of grazing use on current year's forage production. (2) Lack of exercise, temporarily, of a grazing privilege on grazing lands. (3) An authorization to temporarily refrain from placing livestock on public ranges without loss of preference for future consideration.
Nose pump	A livestock watering device that operates a plunger by the action of the watering animal pushing on a nose plate. The animal pushes the nose plate forward while drinking water from the cup below it. When it drinks all the water, the nose plate is fully forward. Once realizing the water is gone, the animal raises its head, the nose plate is released, and the plunger it is connected to forces more water into the cup.

Noxious species	A plant species that is undesirable because it conflicts, restricts, or otherwise causes problems under management objectives. Not to be confused with species declared noxious by laws concerned with plants that are weedy in cultivated crops and on range.
Noxious weed	An unwanted plant specified by Federal or State laws as being especially undesirable, troublesome, and difficult to control. It grows and spreads in places where it interferes with the growth and production of the desired crop.
NPK (GLA)	Letters used to designate the elements of nitrogen, phosphorous, and potassium in that order; usually expressed as a percentage by weight of fertilizer.
Nurse crop	A temporary crop seeded at or near the time primary plant species are seeded to provide protection and otherwise ensure establishment of the latter. Syn. companion crop.
Nutrient	Any food constituent or ingredient that is required for or aids in the support of life.
Nutrient management	Managing the amount, form, placement, and timing of plant nutrient applications to optimize plant growth, provide safe nutritious food, and minimize environmental degradation.
Nutrition	Ingestion, digestion, and/or assimilation of food by plants and animals.
Nutritive value	Relative capacity of a given forage or other feedstuff to furnish nutrition for animals. In range management, the term is usually prefixed by high, low, or moderate.
On-off stocker operation	A grazing system where the grazing is dictated by moving livestock on and off the ranch, such as early intensive stocking.
Open (GLA)	A term commonly used to describe a nonpregnant female animal.
Open range	(1) Rangeland that has not been fenced into management units. (2) All suitable rangeland of an area upon which grazing is permitted. (3) Untimbered rangeland. (4) Rangeland on which the livestock owner has unlimited access without benefit of land ownership or leasing.
Operating unit	Syn. Ranch
Opportunistic species	A species adapted for utilizing variable, unpredictable, or transient environments; characteristic of ephemeral plants.
Opportunity cost	The financial returns given up by not putting a factor of production, particularly capital, to a different use.
Organism	Any living entity: plant, animal, fungus.

Orphan	An offspring whose mother has died.
Outcrop	The exposure of bedrock or strata projecting through the overlying cover of detritus and soil.
Oven-dry weight	The weight of a substance after it has been dried in an oven at 60 degrees for 48 hours.
Overgrazed range	Rangeland that has experienced loss of plant cover and accelerated erosion because of heavy grazing or browsing pressure.
Overgrazing	Grazing that exceeds the recovery capacity of the individual species or the plant community.
Overland flow	Surface runoff of water following a precipitation event. See Runoff.
Overstocking	Placing a number of animals in a given area that will result in overuse if continued to the end of the planned grazing period.
Overstory	The upper canopy or canopies of plants. Usually refers to trees, tall shrubs, and vines.
Overuse	Utilizing an excessive amount of the current year's plant growth which, if continued, will result in deterioration.
Paddock	(1) One of the subdivisions or subunits of the entire pasture unit. (2) A relatively small enclosure used as an exercise and saddling area for horses, generally adjacent to stalls or a stable. Syn. pasture.
Palatability	The relish with which a particular species or plant part is consumed by an animal.
Pan (soils)	Horizon or layer in soils that is strongly compacted, indurated, or very high in clay content.
Partial budgeting	A limited budgeting procedure used to evaluate a proposed investment in an existing earning enterprise requiring only that additional costs and returns associated with the investment be considered. Results are often expressed in terms of an internal rate of return.
Pasture	(1) Grazing lands comprised of introduced or domesticated native forage species that are used primarily for the production of livestock. They receive periodic renovation and/or cultural treatments such as tillage, fertilization, mowing, weed control, and may be irrigated. They are not in rotation with crops. (2) A grazing area enclosed and separated from other areas by fencing or other barriers; the management unit for grazing land. (3) Forage plants used as food for grazing animals. (4) Any area devoted to the production of forage, native or introduced, and harvested by grazing.

Pasture budget	A plan developed to allocate forage to one or more groups of livestock over the grazing season. It is used to identify shortfalls and excesses in forage production, and to evaluate alternatives to either meet or reduce forage demand. It indicates when and how much excess forage to harvest and conserve.
Pastureland	See Pasture.
Pasture planting	Establishing adapted herbaceous species on land to be treated and grazed as pasture.
Peak milk yield (GLA)	The maximum daily milk yield from a lactating cow. Usually occurs 60 to 90 days after calf birth.
Pedestaled	A condition where the soil has eroded from around individual plants or other objects, such as small rocks, leaving them on small pedestals of soil. Sometimes the result of frost heaving.
Pellets	A pesticide formulation similar to granules except pellets are usually more uniform, of a specific weight or shape, and greater than 10 cubic millimeters in size. Often used as rodenticide and slug baits.
Percent use	Grazing use of current growth, usually expressed as a percent of the current growth (by weight) that has been removed. See Degree of use.
Percentage allowable (GLA)	The percentage that is specified in the relative percentage list of range site descriptions for individual plant species or groups of species. This percentage represents the maximum amount of these species, individually or collectively, that can be counted when determining range condition.
Percolation	The flow of a liquid through a porous substance.
Perennial plant	A plant that has a life span of 3 or more years.
Permanent water	A watering place that supplies water at all times throughout the year or grazing season.
Permit	See Grazing license.
Permittee	One who holds a permit to graze livestock on State, Federal, or certain privately-owned lands. Syn. Lessee
Pesticide	Any chemical agent such as herbicide, fungicide, or insecticide, used for control of specific organisms.
Phenology	The study of periodic biological phenomena that are recurrent, such as flowering, or seeding, especially as related to climate.
Phenotype	The appearance of an individual as contrasted with genetic makeup or genotype.

Phenoxy herbicide	Syn. Translocated herbicide
Photo interpretation	The art and science of identifying objects and conditions from photographs.
Photo point	An identified point from which photographs are taken at periodic intervals.
Photo sensitization	A noncontagious disease resulting from the abnormal reaction of light-colored skin to sunlight after a photodynamic agent has been absorbed through the animal's system. Grazing certain kinds of vegetation or ingesting certain molds under specific conditions causes photo sensitization.
Photo toxic	Toxic to plants.
Phylogeny	The origin and evolution of higher taxa.
Physiological stage (GLA)	A unique phase of biological functions of an animal (e.g., growth, pregnancy, lactation).
Phytomass	Total amount of plants (including dead attached parts) above and below ground in an area at a given time. See Biomass.
Phytomer	One modular unit of a plant; consisting of the leaf, sheath (or petiole), and internode.
Pioneer species	The first species or community to colonize or recolonize a barren or disturbed area in primary or secondary succession.
Pitting	Making shallow pits or basins of suitable capacity and distribution on range to reduce overland flow from rainfall and snowmelt.
Plain	A broad stretch of relatively level treeless land.
Planned grazing system	A system in which two or more grazing units are rested and grazed in a planned sequence over a period. Planned grazing systems are designed and applied to meet the needs of the vegetation, the animals, and the overall objectives of the operator.
Planned trend	The change in plant composition within an ecological site from one plant community type to another relative to management objectives and to protecting the soil, water, air, plant, and animal resources. Planned trend is described as moving towards or away from the desired plant community or objective.
Plant association	A kind of climax plant community consisting of stands with essentially the same dominant species in corresponding layers.

Plant community type	Each of the existing plant communities that can occupy an ecological site. Several plant community types will typically be found on an ecological site, including the historic climax plant community for that site.
Plant growth curve (GLA)	The percent growth occurring on a specific location expressed as a monthly percent of the total yearly production. GLA uses growth curves to project daily, monthly, and yearly production on various vegetative areas. Growth curves reflect differences in ecological condition, composition of warm-season and cool-season annuals, herbaceous species, and level of woody plant components.
Plant preference classification (GLA)	<p>Five plant classifications used in GLA:</p> <p>Preferred plant—Composition of a plant species is greater in the diet of the target animal than found in the area being grazed by this animal.</p> <p>Desirable plant—Composition of plant species is approximately the same in the diet of the target animal as that found in the area being grazed by this animal.</p> <p>Undesirable plant—Composition of plant species is lower in the diet of the target animal than is found in the area being grazed by this animal.</p> <p>Toxic plant—Rare occurrence in the diet of the target animal and, if consumed in any tangible amounts, will result in death or severe illness in the animal.</p> <p>Nonconsumed Plant—Plant species that would not be eaten under normal extremes in forage conditions, but if no other forage is available, the target animal will attempt consumption although at greatly reduced rates.</p>
Plant succession	Syn. succession.
Plant symbol	An abbreviation used to indicate the genus and species of a plant.
Plant vigor	Plant health.
Plant vigor index	An estimate of plant vigor based on measurement of one or a few attributes.
PLS	Abbreviation for pure live seed.
Poisonous plant	A plant containing or producing substances that cause sickness, death, or a deviation from the normal state of health of animals. See Toxic plant species.
Poloxalene	An anti-foaming agent fed to prevent legume bloat in ruminants.
Pond	A water impoundment made by constructing a dam or an embankment, or by excavating a pit or dugout usually to supply drinking water for livestock and or wildlife.

Ponding	Water standing in a closed depression that is removed by percolation, transpiration, evaporation, or a combination of these processes.
Postemergence	A herbicide applied after emergence of a specified weed or planted crop.
Potential ADG (GLA)	The potential average daily weight gains of domestic livestock. Weight gains expressed as an average daily gain over a given time period.
Potential natural community (PNC)	The biotic community that would become established on an ecological site if all successional sequences were completed without interferences by man under the present environmental conditions. Natural disturbances are inherent in its development. The PNC may include acclimatized or naturalized nonnative species.
Prairie	An extensive tract of level or rolling land that was originally grass-covered and treeless.
Precipitation	Rainfall; also include snow, hail, and sleet.
Precision farming	Variable rate seeding and/or application of fertilizers and pesticides based on very precise mapping of soil conditions and yield variability done by a computerized global positioning system. It requires grid sampling of soils for fertility and organic matter levels. Harvesting equipment is equipped with a yield monitor linked to GPS receivers. Degree of resolution is cost and equipment driven.
Pre-emergence	A herbicide applied prior to emergence of a specified weed or planted crop.
Preference	See Grazing preference.
Preferred plant (GLA)	See Plant preference classification.
Preferred species	Species that are preferred by animals and are grazed first by choice.
Premature grazing	Grazing before range readiness; may be allowable if done infrequently and followed by adequate rest.
Preparatory crop	A residue-producing temporary crop used as part of seedbed preparation to provide mulch into which forage plants can be directly seeded.
Preplant	A herbicide applied on the soil surface before seeding or transplanting.
Preplant incorporated	A herbicide applied and tilled into the soil before seeding or transplanting.
Prescribed burning	The use of fire as a tool to achieve a management objective on a predetermined area under conditions where the intensity and extent of the fire are controlled.
Prescribed grazing	The controlled harvest of vegetation with grazing or browsing animals, managed with the intent to achieve a specified objective

Prescription fertilization method	A procedure that accounts for nutrient inputs from different sources, primarily from soil residual fertility, manure (when available for use), and commercial fertilizer, if needed. Manure and commercial fertilizer applications are coordinated to deliver the proper ratio of nutrients for the crop.
Primary production	The conversion of solar energy to chemical energy through the process of photosynthesis. It is represented by the total quantity of organic material produced within a given period by vegetation.
Primary productivity	The rate of conversion of solar to chemical energy through the process of photosynthesis. It is represented by the total quantity of organic material produced within a given period by vegetation.
Problem area	An area that is difficult to manage because of its shape, size, accessibility or other limiting factors.
Producer	Rancher or stock farmer
Productivity	The rate of production per unit area, usually expressed in terms of weight.
Propagule	Any part of an organism produced sexually or asexually that is capable of giving rise to a new individual.
Proper grazing use	Grazing at an intensity that will maintain enough cover to protect the soil and maintain or improve the quantity and quality of desirable vegetation.
Proper harvest efficiency (GLA)	The level of harvest efficiency that meets management objectives for range improvement, sustained current levels of production, and short term use.
Proper stocking	Placing a number of animals in a given area that will result in proper use at the end of the planned grazing period.
Proper use	A degree of utilization of current year's growth that, if continued, will achieve management objectives and maintain or improve the long-term productivity of the site. Proper use varies with time and systems of grazing.
Proper woodland grazing	Grazing wooded areas at an intensity that will maintain adequate cover for soil protection and maintain or improve the quantity and quality of trees and forage vegetation.
Prussic acid	A poison, hydrocyanic acid, released when forages containing cyanogenic glycosides and the proper enzymes are chewed by a grazing ruminant.
Pure live seed	Purity and germination of seed expressed in percent; may be calculated by this formula: P.L.S. = % germination x % purity x 100. See Seed purity.
Quality criteria for native grazing lands	One or several plant communities occupying an ecological site that will meet the minimum quality criteria for the soil, water, air, plant, and animal resources and the landowner's or manager's objectives.

Quiescence	A temporary resting phase characterized by reduced activity, inactivity, or cessation of development.										
Rain shadow	The region of diminished rainfall on the lee side of a mountain range, where the rainfall is noticeably less than on the windward side.										
Ranch	An establishment or firm with specific boundaries, together with its lands and improvements, traditionally used for the grazing and production of domestic livestock and/or wildlife. A ranch may also have nontraditional uses and produce other goods and services as well as environmental and social benefits.										
Rancher	One who owns, leases, or manages a ranch.										
Range	Rangelands, native and naturalized pasture, forest and woodlands, and riparian areas that support an understory or periodic cover of herbaceous or shrubby vegetation useful for grazing or browsing by wildlife and/or livestock and that are amenable to range management principles or practices.										
Range condition	<p>(Term is no longer used by NRCS.) The present status of vegetation of a range site in relation to the historic climax or natural potential plant community for the site. Range condition is expressed as a percentage of the climax plant community presently occurring on the range site and grouped into the following range condition classes:</p> <table> <tr> <th>Range condition class</th><th>Percentage of climax plant community present on the site</th></tr> <tr> <td>Excellent</td><td>76–100</td></tr> <tr> <td>Good</td><td>51–75</td></tr> <tr> <td>Fair</td><td>26–50</td></tr> <tr> <td>Poor</td><td>0–25</td></tr> </table>	Range condition class	Percentage of climax plant community present on the site	Excellent	76–100	Good	51–75	Fair	26–50	Poor	0–25
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Excellent	76–100										
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Range forage	Forage produced on rangeland.										
Range improvement	(1) Any structure or excavation to facilitate management of rangeland or livestock. (2) Any practice designed to improve range condition or facilitate more efficient utilization of the rangeland. (3) An increase in the grazing capacity of rangeland; i.e., improvement of rangeland condition.										
Range lambing	Permitting females to drop their offspring on the rangeland under approximately natural conditions of shelter and forage.										
Rangeland	Land on which the historic climax plant community is predominantly grasses, grasslike plants, forbs, or shrubs. Includes lands revegetated naturally or artificially when routine management of that vegetation is accomplished mainly through manipulation of grazing. Rangelands include natural grasslands, savannas, shrublands, most deserts, tundra, alpine communities, coastal marshes, and wet meadows										

Rangeland ecological site	A distinctive kind of land with specific physical characteristics which differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation.
Rangeland health	The degree to which the integrity of the soil, vegetation, water, and air as well as the ecological processes of the rangeland ecosystem is balanced and sustained. Integrity is defined as maintenance of the structure and functional attributes characteristic of a particular locale, including normal variability.
Rangeland hydrology	The study of hydrological principles as applied to rangeland ecosystems.
Rangeland inventory	(1) The systematic acquisition and analysis of resource information needed for planning and for management of rangeland. (2) The information acquired through rangeland inventory.
Rangeland remote sensing	The detection, identification, and assessment of rangelands with a camera, or other imaging device, usually with the aid of aerial or satellite photography.
Rangeland renovation	Improving rangeland by mechanical, chemical, or other means.
Rangeland trend	The direction of change in an existing plant community relative to the historic climax plant community for the ecological site.
Range management	The art and science of manipulating, using, and conserving native grazing land resources to benefit society.
Range plan	Syn. management plan.
Range readiness	The defined stage of plant growth at which grazing may begin under a specific management plan without permanent damage to vegetation or soil. Usually applied to seasonal range.
Range resources	Syn. related resources.
Range seeding	The process of establishing vegetation by the artificial dissemination of seed.
Range suitability	The adaptability of a range to grazing by livestock and/or game animals.
Re-entry interval	Time span that must pass after application of a pesticide before it is safe to enter the treated area. It applies to people and livestock.
Reclaim	To make a site usable again for a particular land use or crop.
Reclamation	Restoration of a site or resource to a desired condition to achieve management or stated goals. See revegetation.
Reconnaissance	A general examination or survey of a region with reference to its main features, usually as a preliminary to a more detailed survey.

Recovery period	The length of time occurring between grazing periods on rotationally stocked pastures. Synonymous with rest period that is animal oriented terminology. Although relieved of grazing pressure, the forages are recovering their photosynthetic area early on, and near the end of the recovery period they are replenishing food reserves and resuming root growth.
Recreation area	A land area reserved and managed for developed and/or undeveloped recreation.
Rejuvenation (browse)	Treatments, such as mechanical, pyric, or even chemical, applied to woody plants to encourage new growth as sprouts or seedlings available for browsing.
Related resources	Those resources that bear relationship to one another because of common location and interdependency, such as range, game, recreation, watershed, soil, or timber.
Relative feed value (RFV)	An index that ranks hay crops relative to the digestible dry matter intake of full bloom alfalfa (RFV = 100).
Remote sensing	The measurement or acquisition of information of some property of an object or phenomenon, by a recording device that is not in physical or intimate contact with the object or phenomenon under study. Often involves aerial photography or satellite imagery. See Rangeland remote sensing.
Reseeding	Syn. range seeding.
Resident species	Species common to an area without distinction as to being native or introduced.
Residual stubble (grazing) height	The height of the forage stand after being grazed, whether intermittently or continuously. When grazed continuously, monitoring must be done regularly as it means at any moment in time under that stocking method.
Resilience	(1) The ability of a native plant community to recover to its former state after it has been altered. (2) The ability of an agroecosystem to return to some previous state or other successional alternative following disturbance, such as fire, plow out, and drought.
Resistance	(1) A measure of the amount of stress a native plant community can endure before it is displaced by a given type of disturbance. (2) Site immunity to being impacted by catastrophic events that have the potential of creating long-term declines in productivity. The basic components, climate and soil, dictate the brittleness of a land-based ecological community.

Response unit (GLA)	A relatively homogeneous area within a management unit in GLA. Response units are defined by soils, range sites, range condition, slope classes, distance to water, barriers, brush densities, past practices resulting in different plant communities, and/or suitability groups.
Rest	The absence of grazing by livestock to benefit plants for regrowth between grazing periods, for critical periods of plant growth and development, or for critical periods of plant establishment. Syn. deferment.
Rest period	A period of deferment included as part of a grazing system.
Restricted area	An area on which grazing tenure is limited.
Rest-rotation	See Grazing system.
Retrogression	Syn. rangeland degeneration.
Revegetation	Establishing or re-establishing desirable plants in areas where the plant community is not adequate to meet management objectives by management techniques alone. See Range seeding.
Rhizome	A horizontal underground stem that usually sends out roots and above-ground shoots from the nodes.
Riparian	Area, zone, and/or habitat adjacent to streams, lakes, or other natural free water, which have a predominant influence on associated vegetation or biotic communities.
Riparian community type	A repeating, classified, defined, and recognizable assemblage of riparian plant species.
Riparian ecosystems	Ecosystems that occur along watercourses or waterbodies. They are distinctly different from the surrounding lands because of unique soil and vegetation characteristics that are strongly influenced by free or unbound water in the soil.
Riparian species	Plant species occurring within the riparian zone. Obligate species require the environmental conditions within the riparian zone; facultative species tolerate the environmental conditions, therefore may also occur away from the riparian zone.
Riparian vegetation	Plant communities in the riparian zone comprised of riparian species.
Rock fragments	The unattached pieces of rock 2 millimeters or larger in diameter contained in or lying on the soil.
Rodent	Any animal of the order Rodentia, and commonly includes the order Lagomorpha, many of which influence rangeland by such habits as grazing and burrowing. Important rangeland rodents include pocket gophers, prairie dogs, ground squirrels, certain terrestrial mice, kangaroo rats, jack rabbits, and marmots.

Rodent control	Measures taken to reduce or control the rodent population of a given area. This may apply to a specific species or rodents in general.
Rodenticides	Poisons used to control rats, mice, and other rodents.
Roller conditioner	A machine that uses intermeshing and nonintermeshing steel or rubber rollers to crush and crack stems of cut legume forages. It was developed for use on legume hay crops to speed drying without shattering leaves.
Rotary mower	A power takeoff driven machine that cuts and shreds plants with a horizontal revolving blade held underneath a metal shroud.
Rotation fertilization method	Some nutrients are added in higher amounts than needed for the current crop in the crop rotation. They are later drawn down by a following crop to keep all nutrient levels within acceptable soil loading levels. Often, it expedites manure spreading and utilization of its nitrogen content.
Rotation grazing	A type of grazing system and involves moving grazing animals from one pasture to another to achieve a desired management objective.
Rough	(1) The accumulation of mature living and dead vegetation, especially grasses and forbs on rangeland. (2) May refer to land surface with uneven terrain.
Roughage	Plant materials containing a low proportion of nutrients per unit of weight. Generally bulky and coarse, high in fiber, and low in total digestible nutrients. Roughage may be classed as either dry or green.
Roundup	The purposeful gathering of animals from a specific area.
Ruderal	A plant inhabiting disturbed sites.
Rumen	The large, first compartment of the stomach of a ruminant from which ingestion is regurgitated for re-chewing and in which digestion is aided by symbiotic action of microbes.
Ruminant	Even-toed, hoofed mammals that chew the cud and have a 4-chamber stomach; i.e., ruminantia.
Runoff	The movement of water from a watershed including both surface and subsurface flow, usually expressed in acre-feet of water yield.
Sacrifice area	(1) A portion of the range, irrespective of site, that is unavoidably overgrazed to obtain efficient overall use of the management area. The area is generally a small area adjacent to a feed trough, water trough, gate, etc. (2) A fenced-off, small portion of a grazing management unit intentionally overgrazed and heavily trafficked to prevent lasting damage to the entire unit. This is only done for short periods during extreme weather conditions. Site is then deferred from grazing until it recovers (includes reseeding if necessary).

Saline soils	Soils with an electrical conductivity greater than 4 millimhos per centimeter that have less than 15 percent of the cation exchange capacity occupied by sodium ions and a pH below 8.5. See sodic soils for a comparison.
Salt ground	An area where salt is placed for use by livestock or game; often relocated periodically to achieve improved animal distribution.
Salt lick	Spots containing unusually large quantities of salts in the soil where animals consume the soil to obtain salt.
Salting	(1) Providing salt as a mineral supplement for animals. (2) Placing salt on the range in such a manner as to improve distribution of livestock.
Salvage value (GLA)	The value remaining in a piece of equipment or other asset at the end of its intended useful life.
Sample	Part of a population taken to estimate a parameter of the whole population.
Sand tank	A water development constructed by placing a dam in a rock-bound channel and bonded to bedrock and by using the sand/gravel trap above the dam for water storage.
Saponins	Any of the various plant glycosides that form soapy colloidal solutions when mixed and agitated with water. When present in forages, the anti-quality chemical depresses growth and intake of grazers and may worsen bloat in ruminants. However, they also impart resistance in forages to disease and insect pests.
Savanna (Savannah)	A grassland with scattered trees, either as individuals or clumps; often a transitional type between true grassland and true forest.
Scrub	Vegetation dominated by low growing woody plants, often forming a dense thicket.
Seasonal distribution	(1) The progressive grazing in a sequence of moves from one part of a range to another as vegetation develops. (2) The normal occurrence of precipitation at different periods of the year.
Seasonal distribution of growth or availability	The tabular or graphical display of monthly increments of total annual forage production available for grazing. It may record growing forage production throughout its growing season or the deferment and release later in the year of accumulated grazeable forage mass to grazing animals.
Seasonal grazing	Grazing restricted to a specific season.
Seasonal use	(1) Synonymous with seasonal grazing. (2) Seasonal preference of certain plant species by animals.
Seasonal zone	An area of rangeland that livestock and wildlife prefer at certain seasons.

Seed	A fertilized ripened ovule of a flowering plant.
Seedbank	Seeds stored in the soil, generally as hard seed, that are viable and will germinate given the proper conditions. This seedbank is principally built up by seed produced by plants growing on or adjacent to the site over many years. Species long gone may still be represented if their seed is especially long-lived.
Seedbed preparation	Soil treatment prior to seeding to: enhance soil surface layer for seed deposition and optimum opportunity for generation and seedling growth, reduce or eliminate existing vegetation, reduce the effective supply of weed seed, modify physical soil characteristics, and enhance temperature and water characteristics of the microenvironment.
Seed certification	A system whereby seed of plant cultivars is produced, harvested, and marketed under authorized regulation to ensure seed of high quality and genetic purity.
Seed, dormant	Live seed in a nongerminative condition because of internal inhibitions in the seed; i.e., hard seed, or unfavorable environmental conditions.
Seed dribbler	A metering device that drops seed onto the track of a crawler tractor for the purpose of being carried forward and pressed into the ground as the tractor passes.
Seed, hard	Live seed in a physiological condition that prevents or delays germination, even when a favorable environment exists.
Seedhead	The inflorescence (flowering part) of a grass where the seed will develop.
Seed inoculation	Treatment of legume seed with rhizobium bacteria before planting to enhance subsequent nitrogen fixation.
Seed purity	The percentage of the desired species in relation to the total quantity, including other species, weed seed, and foreign matter. See Pure live seed.
Seed scarification	Mechanical or acid treatment of seedcoats to improve moisture absorption and enhance germination.
Seedstock	(1) Livestock raised to refine the genetics of a particular breed and sold for breeding purposes primarily. (2) The label applied to a producer of such animals. See Commercial for contrasting term.
Seep	Wet areas, normally not flowing, often created when the elevation of the lateral flow of underground water intersects ground level, as on a hillslope. Occasionally seeps occur from water arising from an underground source.
Selective grazing	The grazing of certain plant species, individual plants, or plant parts on rangeland to the exclusion of others.

Selectivity ratio	The fraction or decimal indicating the proportion of the diet contributed by a plant species, species group, or plant part; an expression of relative preference.
Semiarid	A term applied to regions or climates where moisture is normally greater than under arid conditions, but still definitely limits the production of vegetation. The upper limit of average annual precipitation in the cold, semiarid regions is as low as 15 inches, whereas in warm, tropical regions it is as high as 45 to 50 inches.
Sendero	A path or lane cut or dozed through brushy areas to provide access by livestock, pedestrians, or vehicles. A term commonly used in the Southwest.
Senesce	The yellowing and withering of older, lower leaves of plants as they become shaded by higher, younger leaves. Nutrients in these older leaves are translocated to younger tissue.
Seral	Refers to species or communities that are eventually replaced by other species or communities within a sere.
Seral stages	The developmental stages of an ecological succession.
Sere	All temporary communities in a successional sequence.
Sex ratio	The ratio existing between the number of male and female animals within a given herd, band, or population.
Shearing pens	A general term used to describe the buildings, machinery, pens, and other appurtenances of an establishment where animals are shorn.
Shed lambing	Housing and feeding females during the time offspring are dropped.
Shinnery	Range vegetation having dwarf oaks as dominants.
Short-duration grazing	A grazing system with five or more pastures where the rest period is usually at least four times greater than the grazing period. See Grazing system.
Shrink-swell	The action of soils that are high in montmorillinite clay content. When wet, the clays expand causing the soil to swell. When the soils dry, the clays shrink leaving cracks in the soil from 1 to 2 inches wide and commonly 6 to 20 inches deep. Expansion of the clays is even more pronounced in sodic soils.
Shrub	A plant that has persistent, woody stems, a relatively low growth habit, and generally produces several basal shoots instead of a single bole. It differs from a tree by its low stature and non-arborescent form. Maximum height is generally 4 meters.

Silage	Forage preserved in a succulent condition by organic acids (lactic acid primarily) produced by partial anaerobic fermentation of sugars in the forage.
Similarity index	A similarity index is the percentage of a specific vegetation state plant community that is presently on the site.
Sire (GLA)	The male parent of an animal.
Site	See Ecological site.
Skylining	The development of a line of uniform height of vegetation that gives an illusion of a horizon, usually associated with excessive use of browse. May refer to either top line or under line.
Slope	A slant or incline of the land surface, measured in degrees from the horizontal, or in percent (defined as the number of feet or meters change in elevation per 100 of the same units of horizontal distance); may be further characterized by direction (exposure).
Slugs	Terrestrial mollusks without a shell that prey on seedlings.
Snow fence	A fence used to retard or alter the movement of snow by wind.
Sod	Vegetation that grows to form a mat of soil and vegetation. Syn. turf.
Sod grasses	Stoloniferous or rhizomatous grasses that form a sod or turf.
Sodic soil (nonsaline)	A soil with an electrical conductivity of less than 4 millimhos per centimeter where exchangeable sodium occupies more than 15 percent of the total cation exchange capacity.
Sodic soil (saline)	A soil with an electrical conductivity greater than 4 millimhos per centimeter where exchangeable sodium occupies more than 15 percent of the total cation exchange capacity.
Sod seeding	Direct drilling of seed on sites on which no seedbed preparation had been made.
Soil	(1) The unconsolidated mineral and organic material on the immediate surface of the earth that serves as a natural medium for the growth of land plants. (2) The unconsolidated mineral matter on the surface of the earth that has been subjected to and influenced by genetic and environmental factors of parent material, climate (including moisture and temperature effects), macro- and micro-organisms, and topography, all acting over a period of time, producing soil, which differs from the material from which it was derived in many physical, chemical, biological, and morphological properties and characteristics.

Soil aggregates	Granules formed from the arrangement of primary soil particles (sand, silt, and clay) by flocculation and cementation processes. Plant roots, especially fibrous root systems of grass forage crops, aid in their formation.
Soil amendments	Any material, organic or inorganic, applied to the soil to make it more conducive to vigorous plant growth. Amendments may contain important fertilizer elements, but the term commonly refers to added materials other than fertilizer.
Soil map unit	A map unit is a collection of soil areas or miscellaneous areas delineated in a soil survey. They may encompass one or more kinds of soil or one or more kinds of soil and a miscellaneous area, such as rock outcrop. They are identified by a unique map symbol in a survey area. There are four kinds of map units; consociations, complexes, associations, and undifferentiated groups.
Soil map unit components	The components of a map unit are: (1) The named soil(s) or miscellaneous areas that are dominant and co-dominant in extent. (2) Similar soils or miscellaneous areas that may be extensive, but not as extensive as the named components. (3) Dissimilar soils or miscellaneous areas that are minor in extent. Soil map unit components are rated and assigned to forage suitability groups.
Soil reaction	Numerical expression in pH units of the relative acidity or alkalinity of a soil. The range in soil pH is 1.8 to 11.0. A pH of 7.0 is neutral.
Soil test	A chemical and physical analysis of a soil used to estimate its nutrient supplying power. It must use chemical extraction techniques appropriate for the elements being extracted and the soil being examined. For the results to be interpreted properly, the test procedures must also be calibrated against nutrient rate experiments in the field and in the greenhouse.
Soluble powder	A dry pesticide formulation that dissolves readily in water and forms a true solution. It is not very common because few active ingredients are water soluble.
Solution	A pesticide formulation where the active ingredient is very soluble in water. It is a liquid that contains the active ingredient and additives.
Species	A taxon or rank species; in the hierarchy of biological classification, the category below genus.
Species allowable (GLA)	The maximum percent composition by weight that an individual plant species is expected to contribute to the total composition on a particular site.
Species composition	The proportions of various plant species in relation to the total on a given area. It may be expressed in terms of cover, density, weight, etc.
Spot grazing	Repeated grazing of small areas while adjacent areas are less intensely grazed.

Spray drift	The movement of airborne spray particles from the intended area of application; i.e., horizontal displacement.
Spreader dam	Syn. water spreader.
Spring	Flowing water originating from an underground source.
Spring development	Improving spring and seeps by excavating, cleaning, capping, or providing collection and storage facilities.
Spring-fall range	Rangeland that is grazed primarily during the spring and fall.
Stable	The condition of little or no perceived change in plant communities that are in relative equilibrium with existing environmental conditions; describes persistent, but not necessarily culminating stages (climax) in plant succession. Implies a high degree of resilience to minor perturbations.
Stage of maturity (forage)	The developmental status of a forage crop used to describe a point in time in its progress towards maturity and assess its readiness for harvest as an edible forage or for its seed.
Stand	(1) An existing plant community with definitive bounds that is relatively uniform in composition, structural, and site conditions; thus it may serve as a local example of a community type. (2) An acceptable level of new plants following a seeding or planting operation.
Standing crop (GLA)	The amount of forage available to a target grazing animal at a given time.
Standing crop	The total amount of plant material, in aboveground parts, per unit of space at a given time. It may be modified by the words dead or live to more accurately define the specific type of biomass.
State	A condition of an ecological site's characteristics. As characteristics change, there is a transition to a new state. See Vegetation state and Transition pathway.
Stem	The culm or branch of a plant.
Stock	(1) Abbreviated word for livestock. (2) To place animals on a discrete unit of grazing land. The term graze is often erroneously used in place of stock where the animal is the object of the verb, not the subject.
Stock driveway	Syn. driveway.
Stocking	The human placement of animals onto a management unit so they can graze or browse the plant resource. The term grazing is often erroneously used in place of stocking. Cattle have only one grazing method, while people have devised several stocking methods. Some stocking methods actually prevent livestock from grazing certain areas for a time.

Stocking density	The relationship between number of animals and area of land at any instant of time. It may be expressed as animal-units per acre, animal-units per section, or AU/ha.
Stocking plan	The number and kind of livestock assigned to one or more given management areas or units for a specified period.
Stocking rate	The number of specific kinds and classes of animals grazing or utilizing a unit of land for a specific period of time. May be expressed as animals per acre, hectare, or section, or the reciprocal (area of land/animal). When dual use is practiced (e.g., cattle and sheep), stocking rate is often expressed as animal units per unit of land or the reciprocal.
Stockpiling	Allowing standing forage to accumulate for grazing at a later period, often for fall and winter grazing after dormancy.
Stock pond	A water impoundment made by constructing a dam or by excavating a dugout or both, to provide water for livestock and/or wildlife.
Stock trail	A trail constructed across a natural barrier to permit movement of livestock to otherwise inaccessible areas.
Stock trails and walkways	A livestock trail or walkway constructed to improve grazing distribution and access to forage and water.
Stock water development	Development of a new or improved source of stock water supply, such as well, spring, or pond, together with storage and delivery system.
Stolon	A horizontal stem which grows along the surface of the soil and roots at the nodes.
Strip grazing	Confining grazing animals to a specified portion of a grazing area for a limited time. Strip grazing usually refers to temporarily subdividing a grazing area into subunits with temporary fences so grazing for short periods, often 4 hours or less, can be achieved.
Stubble	The basal portion of herbaceous plants remaining after the top portion has been harvested either mechanically or by grazing animals.
Submarginal land	Land that is either physically or economically incapable of indefinitely sustaining a certain use.
Substitution ratio	Number of animals or animal-units of one kind or class that can be substituted for another kind or class to meet a specified management objective. Syn. animal-substitution ratio.
Subunit	The subdivisions of a single grazing system. See Paddock and Pasture.

Succession	The progressive replacement of plant communities on an ecological site that leads to the climax plant community. Primary succession entails simultaneous successions of soil from parent material and vegetation. Secondary succession occurs following disturbances on sites that previously supported vegetation, and entails plant succession on a more mature soil.
Suitability	(1) The adaptability of an area to grazing by livestock or wildlife. (2) The adaptability of a particular plant or animal species to a given area.
Suitable range	(1) Rangeland accessible to a specific kind of animal and which can be grazed on a sustained yield basis without damage to the resource. (2) The limits of adaptability of plant or animal species.
Summer range	Rangeland, particularly in the mountainous Western States, that is grazed primarily during the summer growing season.
Supplement	Nutritional additive (salt, protein, phosphorus) intended to remedy deficiencies of the range diet.
Supplemental cropland pasture	An annual forage crop planted between two primary cultivated crops to provide supplemental grazing of enhanced nutritive quality during periods of low production and/or forage quality on other pastures or rangeland.
Supplemental feeding	Supplying concentrates or harvested feed to correct deficiencies of the range diet. Often erroneously used to mean emergency feeding.
Surfactant (surface active agent)	Materials used in herbicide formulations to bring about emulsifiability, spreading, wetting, sticking, dispersibility, solubilization, or other surface-modifying properties.
Suspension fence	Nonwoven wire fence comprised of high tension wire supported by widely spaced posts to which the wire is firmly attached, but is loose against the post to allow the wire to move back-and-forth at the point of attachment.
Sustained yield	Production of specified resources or commodities at a given rate for a designated unit of time.
Swale	An area of low and sometimes wet land.
Swath	A strip of cut herbage lying on the stubble left by the cutter bar, blade, flail, rotary drum, or disc blade setting of the mower, mower-conditioner, binder, swather, or small grain head on a combine.
Synecology	A subdivision of ecology that deals with the study of groups or organisms associated as a unit; i.e., communities.
Tag	(1) A label attached, usually to the animals, for identification. (2) A discolored and dirty part of a fleece.

Tagging	(1) The process of attaching identifying tags to animals. See Brand and Marking. (2) Clipping manured and dirty locks from sheep.
Tagging chute	A narrow enclosure (of board, pole, or steel construction) to hold animals during tagging.
Tame pasture	Implies the forages growing on the land unit have been purposely cultivated by people as opposed to being wild growth of random origin. In permanent pastures it is often a combination of the two mechanisms and, therefore, a rather subjective and imprecise term. Synonymous with improved pasture.
Tank	A reservoir of any construction for water storage.
Tannin	An antiquality chemical consisting of a broad class of soluble polyphenols that occur naturally in many forage plants. They all condense with protein to form a leatherlike substance that is insoluble and of impaired digestibility. This can be good if it allows some protein to bypass the rumen and be digested in the lower digestive tract of ruminants. Excessive levels, however, interfere with digestion rate by reducing rumen microbial populations.
Taproot system	A plant root system dominated by a large primary root, normally growing straight downward, from which most of the smaller roots spread out laterally.
Tedder	A machine used in very humid areas to aid forage drying. It stirs cut forage lying on a field with metal tines that rotate on a series of horizontally spinning rotors.
Temporary license or permit	A document authorizing grazing of a certain number of livestock on public lands during an emergency or for a certain period, terminable at the end of such period and with no guarantee of renewal in whole or in part. See Grazing license or Permit.
Term license or permit	A document authorizing grazing on public lands for a stated number of years as contrasted with an annual or temporary license or permit. See Grazing license or Permit.
Terracing	Mechanical movement of soil along the horizontal contour of a slope to produce an earthen dike to retain water and diminish the potential of soil erosion.
Theoretical length of cut	The length of cut set with the shear plate on a forage harvester. Setting is critical to ensure forage pieces will be small enough to ensure good compaction in a silo while preserving effective fiber length for good rumen function.
Thermoneutral zone (comfort zone)	Within a certain range of ambient temperature the heat produced by normal metabolism of a resting animal is minimal and is enough to cover the heat loss.

Tiller	(1) An erect shoot that arises from the crown of a grass. (2) A grass that is growing tillers. (3) The asexual development of a new plant from a meristematic region of the parent plant.
Total annual production	The total annual production of all plant species of a plant community.
Total digestible nutrients (TDN)	The total digested energy in a feedstuff expressed in units of weight or percent.
Total digestible nutrients (TDN) (GLA)	The total digested energy of a feed expressed as a caloric value.
Toxic plant species	A species of plant that may accumulate or produce a substance toxic to animals. See Poisonous plant.
Toxicant	The chemical ingredient(s) that may injure or cause death in either plant or animal life exposed to it.
Trace element	An element essential for normal growth and development of an organism, but required only in minute quantities.
Trafficability	The condition presented by the soil that influences the degree of ease of movement by livestock, humans, or machinery across its surface. This is influenced by the size and number of surface rock fragments, soil wetness, degree of plasticity, organic matter content of soils, and the climatic setting that drives those characteristics to affect ease of movement.
Trail	A well-defined path created by repeated passage of animals.
Trail herding	Directing and controlling the movement of a group of livestock on restricted overland routes.
Trailing	(1) Controlled directional movement of livestock. (2) Natural trailing is the habit of livestock or wildlife repeatedly treading in the same line or path. See Drive.
Trampling	Treading underfoot; the damage to plants or soil brought about by movements or congestion of animals.
Transition pathway	Process(es) that cause a shift from one state to another on an ecological site.
Translocated herbicide	A herbicide moved within the plant from the point of entry.
Trap	A relatively small enclosure used as a temporary holding or catching area in the handling and management of livestock.

Tree	A woody perennial, usually single stemmed plant that has a definite crown shape and reaches a mature height of at least 4 meters. The distinction between woody plants known as trees and those called shrubs is gradual. Some plants, such as oaks (<i>Quercus</i> spp.) may grow as either trees or shrubs.
Trend	A rating of the direction of change occurring on an ecological site. See Rangeland trend and Planned trend.
Trespass	Syn. grazing trespass.
Trick tank	A modification of a guzzler in which the collection basin is elevated and the storage tank is located directly below.
Trophic levels	The sequence of steps in a food chain or food pyramid from producer to primary, secondary, or tertiary consumer.
Trough	(1) A large container with necessary controls and valves that provides drinking water for livestock and wildlife. (2) A feeding container that holds livestock feed and/or minerals for consumption by livestock and some wildlife species.
Turf	Syn. sod.
Turnout	Act of turning livestock out on rangeland at the beginning of the grazing season.
Type	Syn. Vegetation type.
Type line	The boundary line that separates two distinctive vegetation types on a map or photograph.
Unauthorized use	The grazing of livestock on a range area without proper authority.
Unconsumed plant (GLA)	See Plant preference classification.
Under grazing	The act of continued underuse.
Under stocking	Placing a number of animals in a given area that will result in underuse at the end of the planned grazing period.
Understory	Plants growing beneath the canopy of other plants. Usually refers to grasses, forbs, and low shrubs under a tree or shrub canopy.
Underuse	A degree of use less than the desired use.
Undesirable species	(1) Species that are not readily eaten by animals. (2) Species that conflict with or do not contribute to the management objectives.
Ungulate	A hoofed animal, including ruminants, but also horses, tapirs, elephants, rhinoceroses, and swine.

Unsuitable range	Range that has no potential value for, or which should not be used for, a specific use because of permanent physical or biological restrictions. When unsuitable range is identified, the identification must specify what use or uses are unsuitable (e.g., unsuitable cattle range).
Upright or tower silo, conventional	A cylindrical silo made of concrete staves, generally ranging from 12 to 30 feet in diameter and up to 80 feet in height. The staves are held together by steel rods that encircle them. It is usually unloaded from the top.
Upright or tower silo, oxygen-limiting	A cylindrical silo made of steel with a glass fused coating on it. The steel panels are bolted together. The silos range in diameter from 20 to 27 feet and in height from 32 to 104 feet, are unloaded from the bottom, can be refilled at any time, and continue to unload oldest silage first.
Usable forage	The portion of the standing forage crop that can be grazed off without damage to the forage plants. It varies by plant species, season of use, and companion plant species that need favoring to promote their continued existence in the stand. The pasture management section refers to it also as available forage.
Usable forage production (GLA)	An entry method that allows you to enter an estimate of annual production that is consumable by the target livestock population.
Use	(1) The proportion of current year's forage production that is consumed or destroyed by grazing animals. May refer either to a single species or to the vegetation as a whole. Syn., degree of use. (2) Utilization of land for a purpose, such as grazing, bedding, shelter, trailing, watering, watershed, recreation, forestry, and wildlife habitat.
Utilization	Syn., use.
Vapor drift	The movement of pesticidal vapors from the area of application.
Variable cost (GLA)	Expenses that change with the number of animals in the herd. Examples of variable costs include supplemental feed, veterinary services and supplies, and labor.
Variable rotational stocking	A stocking method that adjusts the recovery period between grazing periods to the variable growth rate of the forage species being grazed. It attempts to offer a uniform forage allowance to livestock each day of the grazing season through the allocation of forage by sequential grazing of paddocks.
Variable stocking	The practice of varying the stocking rate through the plant growing season with the objective of utilizing forage at a rate similar to its growth rate. This can be done by either varying the number of animals on a set acreage or varying the acreage offered to a set number of animals.
Vegetation states	The various plant communities produced by an ecological site within given site characteristics.

Vegetation type	A kind of existing plant community with distinguishable characteristics described in terms of the present vegetation that dominates the aspect of physiognomy of the area.
Vegetative	Relating to nutritive and growth functions of plant life in contrast to sexual reproductive functions. (adj.) Of or relating to vegetation.
Vegetative management practices	Practices that are directly concerned with the use and growth of plants. These include such practices as prescribed grazing and livestock exclusion.
Vegetative production	Production of new plants by any asexual method.
Vegetative state	Stage of maturity prior to the appearance of inflorescences. In grasses, it is prior to boot stage. In legumes, it is prior to the appearance of buds.
Veld	The open temperate grassland areas of Southern Africa, typically containing scattered shrubs or trees.
Vigor	Relates to the relative robustness of a plant in comparison to other individuals of the same species. It is reflected primarily by the size of a plant and its parts in relation to its age and the environment in which it is growing. Syn. plant vigor.
Volunteers	Plants not purposely planted germinating from seed laid down from imported plant residue or by parent plants growing on the site at some previous time. How distant the time is dependent on the longevity of the seed. These plants are aggressive enough to fill in voids in the plant canopy or grow after dormancy or harvest of the planted crop.
Walkway	An earthen embankment constructed to improve the accessibility of marsh rangeland. See Stock trails and walkways.
Warm-season plant	A plant that makes most or all its growth during the spring, summer, or fall and is usually dormant in winter. (2) A plant that usually exhibits the C-4 photosynthetic pathway.
Water budget	An irrigation tool that keeps track on a daily basis of the amount of plant available water in the soil over a 12 month period. It sums soil water depletion by evapotranspiration using one of the climatonic estimators and deducts water inputs from precipitation or irrigation. This yields the amount of irrigation water needed to be applied to bring the soil back to field capacity within the root zone of the crop being irrigated. Water applications in excess of field capacity are assumed lost to percolation or runoff.
Water gap	(1) A specially constructed fence across a drainage. The fence is easily moved by the forces of a flood, thus preventing damage to the permanent fence. (2) An opening or fenced area providing access to a developed or natural water supply permitting one watering facility to serve two or more pastures.

Water potential	The thermodynamic state of the water in a cell, organism, or soil equal to the difference in free energy per unit volume between matrically bound, pressurized, or osmotically constrained, water and that of pure water.
Water ram	A hydraulic pump that uses water power (flow rate or hydraulic head) to pump a small portion of the total water inflow through a pipe to a higher elevation.
Watershed	(1) A total area of land above a given point on a waterway that contributes runoff water to the flow at that point. (2) A major subdivision of a drainage basin.
Water-soluble packet	Wettable powder or soluble powder formulations of low dosage, highly toxic pesticides packaged in soluble plastic bags. Packets are dropped into a sprayer tank where they dissolve and mix with the spray liquid.
Water spreader	A terrace, dike, or other structure intended to collect and distribute surface-water runoff from natural channels, gullies, streams, or broad drainage areas. The purpose is to increase the area of infiltration.
Waterway	A way or channel for water.
Weed	(1) Any growing unwanted plant. (2) A plant having a negative value within a given management system.
Well	A water source developed by drilling vertically through soil, subsoil, and geological strata to intercept underground water storage or stream areas.
Well horizontal	A water source developed by drilling horizontally into a hillside to intercept a perched water table or underground water source.
Wetland communities	Plant communities that occur on sites with soils typically saturated with or covered with water most of the growing season.
Wetlands	Areas characterized by soils that are usually saturated or ponded; i.e., hydric soils, and that support mostly water-loving plants; i.e., hydrophytic plants.
Wet meadow	A meadow where the surface remains wet or moist throughout the growing season, usually characterized by sedges and rushes.
Wettable powder	Dry, finely ground formulation where the active ingredient is combined with a dry carrier, usually mineral clay, along with other ingredients that enhance suspension of the material in water. Very widely used. It is of lower toxicity than other formulations, but can be inhaled while dispensing and needs constant, effective agitation in the spray tank to avoid uneven application.

Wildlife	Undomesticated vertebrate animals considered collectively, with the exception of fish.
Wildlife refuge	A land area reserved and managed for the benefit of one or more species of wildlife.
Windrow	(1) Curing herbage dropped or raked into a narrow swath sized to be picked up easily by the head of a baler, combine, or forage harvester. (2) To cut or rake into windrows.
Winter range	Range that is grazed during the winter months.
Wolf plant	(1) An individual plant that is generally considered palatable, but is not grazed by livestock. (2) An isolated plant growing to extraordinary size, usually from lack of competition or utilization.
Woody	A term used in reference to trees, shrubs or browse that characteristically contain persistent ligneous material.
Xeric	Having very little moisture; tolerating or adapted to dry conditions.
Yearling	An animal approximately 1 year of age. A short yearling is from 9 to 12 months of age and a long yearling is from 12 to 18 months.
Yearlong grazing	Continuous grazing for a calendar year.
Yearlong range	Rangeland that is, or can be, grazed yearlong.
Yield	(1) The quantity of a product in a given space and/or time. (2) The harvested portion of a product.
Zoning (rural)	A means by which governmental authority is used to promote a specific use of land under certain circumstances. This power traditionally resides in the state, and the power to regulate land uses by zoning is usually delegated to minor units of government, such as towns, municipalities, and counties, through an enabling act that specifies powers granted and the conditions under which these are to be exercised.

Appendix A

NRCS Policy on Prescribed Burning on Grazing Lands

NRCS supports and encourages the use of prescribed burning on rangeland, pastureland, forest land, hayland, Conservation Reserve Program (CRP) land, and wildlife land to meet specific resource management objectives. The national standard for prescribed burning is in the National Handbook of Conservation Practices.

Training, certification, and authority

NRCS encourages its employees to participate in prescribed burning training activities and workshops. Training is required to address both the principles of planning and safely executing the prescribed burn, as well as the effect that the fire will have on the plant and animal species and communities within the burn area.

Only trained and qualified personnel are authorized to provide assistance in planning or implementing prescribed burns. The extent to which an NRCS employee may provide technical assistance will be restricted by the job approval authority and/or certification level that has been attained. NRCS job approval authority criteria are required to be established in states where prescribed burning is practiced. Authority criteria are progressive in nature allowing employees to participate in more complex burns only when they are qualified to do so. Example A-1 of this appendix is job approval authority criteria.

In states where certification or licensing is required for prescribed burning authority, NRCS personnel must be certified or licensed, or both, by the designated agency to participate in prescribed burning activities.

Planning prescribed burns

Burns planned with NRCS assistance must adhere to all Federal, State, and local laws regarding outdoor burning, fire control, smoke management, and air quality. In states where designated agencies have responsibility for burning activities, NRCS will work with them and through them to fully utilize their expertise, personnel, and equipment. Where no agency has this responsibility, prescribed burns will be planned cooperatively and cleared through such groups as rural fire departments, county commissioners, law enforcement offices, adjacent landowners, U.S. Forest Service, Bureau of Land Management, and state forestry, wildlife, and natural resource agencies, as applicable.

The landowner is responsible for obtaining all permits and clearances as required by law. Adherence to the Clean Air Act (42 U.S.C. 7401 - 7671q) is required for all prescribed burns.

The national and state practice standards for prescribed burning are used to guide the overall development of the detailed plan. A detailed plan for the prescribed burn must be prepared. Example A-2 of this appendix is a prescribed burn detailed plan. Required items to be addressed include, but are not limited to:

- Location of the burn
- Resource management objectives of the burn
- Pre-burn vegetative description of the area
- Prescription for weather conditions required
- Description of the burning method to be used
- Description of pre-burn preparation
- Firing sequence of area to be burned
- Job assignments and descriptions of responsibilities for all persons assisting with the burn
- Equipment and materials checklist
- Job assignments and descriptions of responsibilities for all persons assisting with the fire patrol, containment, mop-up, and suppression of the burn
- Post-burn evaluation and management

Technical application assistance

Only NRCS personnel with the required training and certification are authorized to assist with the planning and application of prescribed burns. Extent of assistance is restricted by the individual's job approval authority, certification level, or both.

For purposes of training landowners and managers and other NRCS employees, properly trained and certified NRCS personnel may participate in the following activities:

- Development of the prescribed burning plan
- Serve as fire boss
- Determine field and weather conditions for compliance with the prescription
- Serve as team leader for the implementation and completion of burn
- Direct field operations and make decisions, adjustments, and corrections necessary to ensure that the fire meets the planned objectives and that all participants are safe
- Assist with ignition of the fire

Safety must always be the first consideration in prescribed burning. The landowner or cooperator must be informed in writing that he or she may be liable for damages if the fire escapes or smoke damage occurs. If unfavorable or unstable atmospheric, fuel, or logistical situations exist, the NRCS employee must advise the fire boss or landowner to postpone the burn. If an emergency situation develops, NRCS employees are to follow the direction of the designated fire boss and act responsibly to resolve the situation.

NRCS employee liability

Employees acting in accordance with all Federal, State, and local laws and within the scope of their work accept no greater or less liability than that associated with the performance of any other assigned duty. Any questions concerning liability should be referred to the appropriate state conservationist.

State office responsibility

The NRCS state office will be responsible for providing adequate training and equipment for employees involved in prescribed burning activities. States will develop job approval authority criteria and ensure that employees act within their training and certification levels. States will ensure that only qualified NRCS employees are used for reviews and spot checks of prescribed burning activities. Job approval criteria are reviewed and concurred in by the appropriate range-land management specialist, forage agronomist, or other designated grazing lands specialist.

Prescribed Burning Job Classifications

Class Ia - Maintenance Burn

- * Size of area: Less than 100 acres
- Vegetation: non-volatile herbaceous and woody species
- Terrain: 5% slope or less

Class Ib - Maintenance Burn

- * Size of area: Less than 320 acres
- Vegetation: non-volatile herbaceous and woody fuel
- Terrain: 5% slope or less

Class Ic - Maintenance Burn

- * Size of area: Less than 640 acres
- Vegetation: non-volatile herbaceous
- Terrain: 5% slope or less

Class II - Maintenance Burn

- * Size of area: Less than 100 acres
- Vegetation: Same as Class Ia plus volatile herbaceous species and live volatile woody species less than 4 feet tall.
- Terrain: 8% slope or less

Class III - Maintenance Burn

- * Size of area: Less than 640 acres
- Vegetation: Same as Class II plus live volatile woody species greater than 4 feet tall and dead volatile woody species.
- Terrain: 12% slope or less

Class IV - Maintenance Burn

- * Size of area: no restrictions
- Vegetation: no restrictions
- Terrain: no restrictions

Class V - Reclamation Burn

- *Size of Area: no restrictions
- Vegetation: no restrictions
- Terrain: no restrictions

- * Size of Area Contiguous acres to be burned on a single management unit during the same growing season are considered to be one prescribed burn regardless of the number of individual segments the fire is divided into. Total acres for any prescribed burn can't exceed the Size of Area limits for the appropriate job classification.

SEPARATE PRESCRIBED BURNING PLANS MUST BE DEVELOPED FOR EACH IDENTIFIABLE PRE-SCRIBED BURN.

To have job approval authority, an employee must have completed a formal NRCS prescribed burning training course including participation in a field training burn and supervised participation in at least three prescribed burns at which NRCS provided technical assistance. The individual must demonstrate good judgment, knowledge, and skills in prescribed burning.

The following are the requirements for the job approval authority:

- Class I** Individual must have properly planned at least three Class I burns which have been approved and must have demonstrated good judgment, knowledge, and skills for Class I burns.
- Class II** Individual must have Class I approval authority, must have properly planned at least three Class II burns which have been approved and must have demonstrated good judgment, knowledge, and skills for Class II burns.
- Class III** Individual must have Class II approval authority, must have properly planned at least three Class III burns which have been approved and must have demonstrated good judgment, knowledge, and skills for Class III burns.
- Class IV** Individual must have Class II approval authority, must have properly planned at least three Class IV burns which have been approved and must have demonstrated good judgment, knowledge, and skills for Class IV burns.

Any NRCS employee who violates NRCS Prescribed Burning Policy will have their job approval authority revoked immediately.

Job approval authority may be granted to employees who have documented evidence of previous training or experience that equals or exceeds NRCS prescribed burning training requirements. NRCS occasionally hires an employee with extensive training, experience, and education in prescribed burning while in college, at another agency, etc.

Prescribed burn management plans are valid only for the area planned and for the burning season planned. If the landowner decides to change the location of the burn or is unable to burn during the prescribed time frame, a new plan must be prepared prior to conducting the burn.

**Prescribed Burn
(Planning)**

* Landowner/Operator: _____ Date: _____
 Address: _____ Phone: _____
 Acres to burn _____ Planned date of burn: _____
 Location (county): _____ T _____ R _____ S _____ Field # _____

A. Description of burn area: _____ Land use : _____

1. Present plant cover

a. Woody plants

Species	Height (ft)	Basal diam in.	% Canopy
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

b. Herbaceous plants:

Species	Amounts in tons/acre	
	Cured	Green
Cool-season grass	_____	_____
Warm-season grass	_____	_____
Forbs	_____	_____

2. Slope _____ % Aspect _____ Soil type _____

B. **Objective and timing of burn:**

Stimulate WS grass (1-3" WSG)
 Distribute grazing (1-3" WSG)
 Stimulate CS grass (1-3" CSG)
 Remove litter (1-3" C&WSG)
 Reason(s) for burning: _____

Control woody plants (full leaf)

Reduce CS grass (1-3" WSG)
 Improve wildlife habitat (1-3" WSG)
 Stimulate forbs (Before forb Growth)
 Reduce wildfire hazard (1-3" WSG)

C. Acceptable conditions for prescribed burns:

Relative Hum. (%)	Wind speed in miles/hour							
	4	6	8	10	12	14	16	C - 60% to 90%
25-34	C-S	C-S	C-S	C	XXXXX	XXXXX	XXXXX	cloud cover or
35-39	C-S	C-S	C-S	C-S	C	XXXXX	XXXXX	before 10:00 a.m.
40-44	C-S	C-S	C-S	C-S	C-S	C	XXXXX	after 3:00 p.m.
45-59	C-S	C-S	C-S	C-S	C-S	C-S	C	
60-69	S	C-S	C-S	C-S	C-S	C-S	C-S	S - 0% to 59%
70-79	XXXXX	S	C-S	C-S	C-S	C-S	C-S	cloud cover or from
80-89	XXXXX	XXXXX	S	C-S	C-S	C-S	C-S	10:00 a.m. until 3:00
p.m.								

1. Comments: (firing method, starting time, wind direction, soil surface moisture condition, etc.) _____

2. Ignition plan and/or firing sequence (see plan map).

* Parties igniting a prescribed burn may be liable for damages resulting from the fire and control cost, should fire escape the designated area.

D. Preparation of area for burning:

1. Firebreak construction:

- a. Firebreak widths will be equal to or greater than two times the height of adjacent vegetation.
- b. Plowed, disked and burned firebreaks, being essentially devoid of fuel, provide least danger of fire escape.
- c. Close mowed and cool-season grass firebreaks have fuel available that can provide an avenue for fire escape. Smoke, from green growth, reduces visibility, inhibiting burn monitoring.
- d. High mowed fire intensity reduction lines (" - 12" stubble), will be installed if fine fuel exceeds 1.5 ton/acre. Line with will be at least 10 feet @ 1.5-3 T/A and 20 feet @ >3 T/A.

e. Kind of fireline	Width feet	Length feet	Date to apply
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

- f. Existing firebreaks, streams, roads, tilled fields, etc. (Show on plan map). Describe

- g. Potential hazards are present within the burn area: ____ yes ____ no
e.g.: power lines, snags, structures, etc. (Show on plan map). If yes, explain precautions:

E. Adjacent areas (Outside of burn area)

1. Special precaution areas: e.g. Leaf litter, dry grass, roads, structures, smoke dispersion, _____ etc. (Show on plan map). Precautions needed: _____

2. Backup or secondary firebreak locations: (Identify) _____

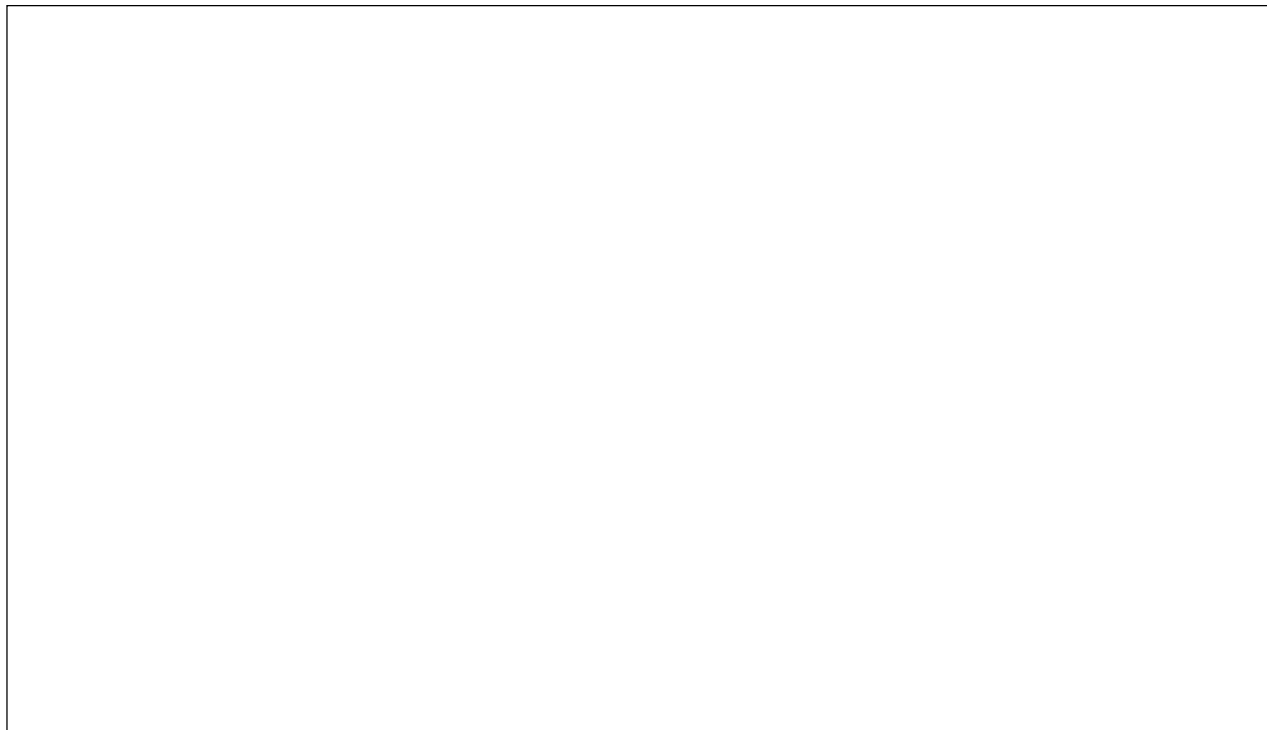
F. Equipment/personnel needs:

1. Safety equipment: _____
2. Tools/equipment needed for burn: () rakes () swatter () drip () torches, () backpack pump, () other: _____
3. Personnel needed for burn: _____

G. Special considerations:

1. Precautions to prevent fire escape: _____
2. Suppression plan if fire escapes: _____
3. Patrol and mop-up plan: _____

Prescribed Burn Plan Map
(use aerial photos if scale is appropriate)



(Identify land use in adjacent fields)

Legend

Approximate Scale: _____ inches = mile

B-B-B-B-B-	Burned firebreak	W	Water source
P-D-P-D-P-	Plowed / Disked Firebreak	(A, B, etc.)	Firing crews
C-S-C-S-C-	Cool-season Grass Firebreak	(1, 2, etc.)	Firing sequence
CM-CM-CM-	Close Mowed firebreak	(A1) ->->->	Firing direction
-HM-HM-HM-	High Mowed intensity reduction	—WIND—	Wind Direction

Other legends or information: _____

Plan prepared by: _____ Date: _____

Plan checked by: _____ Date: _____

I, _____, have requested the preparation of this prescribed burn plan; my signature establishes my acceptance of full liability resulting from the implementation of this plan.

Landowner/Operator: _____ Date: _____

 _____ (signature)

Prescribed Burn Application

* Landowner/Operator: _____ Date _____

Acres to burn: _____ Date burn applied: _____

Location: County: _____ T _____ R _____ S _____ Field # _____

A. Preburn checklist: (day of burn)

- | | | |
|---|-----------|----------|
| 1. Weather forecast favorable | yes _____ | no _____ |
| 2. Necessary firebreaks constructed | yes _____ | no _____ |
| 3. Potential hazards accounted for | yes _____ | no _____ |
| 4. Special precaution areas noted | yes _____ | no _____ |
| 5. Backup/secondary firebreak locations noted | yes _____ | no _____ |
| 6. Safety equipment adequate | yes _____ | no _____ |
| 7. Tools/equipment onsite | yes _____ | no _____ |
| 8. Personnel needed available | yes _____ | no _____ |
| 9. Special considerations reviewed with crew | yes _____ | no _____ |
| 10. Actual weather at burn: Temp. _____ Humidity _____ Wind-Speed _____ | | |
| Cloud cover _____ % Fronts or changes expected? | yes _____ | no _____ |
| 11. Appropriate neighbors informed | yes _____ | no _____ |
| 12. Notification of units of government made: | yes _____ | no _____ |
| Local fire department (phone) _____ USFS (phone) _____ | | |
| Sheriff (phone) _____ MDC (phone) _____ | | |
| 13. Necessary permits obtained | yes _____ | no _____ |
| 14. Test burn performed as expected | yes _____ | no _____ |

Explanation of no response _____

Checked by: _____ Date: _____

B. Post-burn evaluation (day of burn):

1. Burning method used: _____
2. Start of test burn Beginning Time _____ a.m. () p.m. ()
 Mop-up completed Ending Time _____ a.m. () p.m. ()
3. Observed change in weather conditions during the burn: _____

4. Fire behavior: (check one)

a. Spotting	one ()	few ()	many ()
b. Difficult to control		yes ()	no ()
c. Convection column		yes ()	no ()
d. Fire whirls		yes ()	no ()
5. Objective of burn met _____

6. Post-burn management plan (additional treatment needs): _____

7. Future burn needed: yes () no () estimate when _____
8. Other comments: _____

Checked by: _____ Date _____

* Parties igniting a prescribed burn may be liable for damages resulting from the fire and control cost, should fire escape the designated area.

C. Followup evaluation (60-90 days after burn)

1. Objectives of burn met: _____

2. Post-burn management plan (additional treatment needs): _____

3. Future burn needed: yes () no () if yes, when? _____
for what purpose? _____

4. Other comments: _____

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